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DIESEL RAILWAY TRACTION SUPPLEMENT

The July issue of THE RAILWAY GAZETTE *Supplement, illustrating and describing developments in Diesel Railway Traction, is now ready, price* 1*s.*

GOODS FOR EXPORT

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as indicating that they are available for export

NOTICE TO SUBSCRIBERS

Consequent on the paper rationing, new subscribers cannot be accepted until further notice. Any applications will be put on a waiting list and will be dealt with in rotation in replacement of subscribers who do not renew their subscriptions

POSTING "THE RAILWAY GAZETTE" OVERSEAS

We would remind our readers that there are many overseas countries to which it is not permissible for private individuals to send printed journals and newspapers. THE RAILWAY GAZETTE *possesses the necessary permit and facilities for such dispatch.*

We would emphasise that copies addressed to places in Great Britain should not be re-directed to places overseas

TO CALLERS AND TELEPHONERS

Until further notice our office hours are:
Mondays to Fridays 9.30 *a.m. till* 5.30 *p.m.*
The office is closed on Saturdays

ANSWERS TO ENQUIRIES

By reason of staff shortage due to enlistment, we regret that it is no longer possible for us to answer enquiries involving research, or to supply dates when articles appeared in back numbers, either by telephone or by letter

ERRORS, PAPER, AND PRINTING

Owing to shortage of staff and altered printing arrangements due to the war, and less time available for proof reading, we ask our readers' indulgence for typographical and other errors they may observe from time to time, also for poorer paper and printing compared with pre-war standards

Home Railway Dividends

THIS month the boards of the four main-line railway companies will meet to decide the distributions on the junior stocks of their various companies. The directors of the L.M.S.R. and L.N.E.R. and Southern have planned their meetings for July 27, and the Great Western Railway directors will meet on the next day. There seems little likelihood that the dividend decisions in relation to the first six months of this year will show any variation over those twelve months ago, when the Great Western ordinary interim was 2 per cent., that on Southern preferred 2½ per cent., and that on L.N.E.R. second preference 1 per cent. The Southern is precluded by its statute from making an interim payment on its deferred stock, and there was no interim dividend last year on L.M.S.R. ordinary. From the correspondence between the Chairmen of the companies and the Minister of War Transport, published on another page, there is no prospect of the railway control agreement being changed for at least a year after the war. Revenues, therefore, will continue to be based on the rental paid by the Government, irrespective of the increasing volume of total net revenues. The high yields on home railway junior stocks, of between 6 and 8 per cent., are out of proportion to the yields on industrial securities, but the reason is to be found not so much in the continuance of the control agreement as in the uncertainty which surrounds the post-war railway position.

Railway Electrification

In the course of an article by Candidus in *The Investors' Chronicle*, dealing with electrification of railways, the view is expressed that it is certainly possible, and even probable, that after the war certain urban and suburban electrification in this country will pass the "Does it pay?" test, mainly because of the heavy traffic density in those areas, but even here, it is pointed out, it is essential that there shall be a settled policy for transport as a whole, that will make the commercial risk reasonably possible to accept. It is no use, for example, thinking of developing alternative facilities parallel to a section planned for electrification and going ahead with each in isolation. It may be that the aggregate capital involved cannot be remunerated by the traffic affected, actual and potential. The matter is made all the more uncertain if the alternative facilities are roads paid for out of public funds. It is even more true if the issue be one of main-line electrification. Electrification on a large scale would entail a greater investment on fixed assets with its effect on cost, interest, repair, renewal, and local rates. There is the clear risk of this greater investment becoming unprofitable in the absence of a general plan for transport as a whole, which would permit of the investment being made self-supporting.

Commercial Considerations

There can, of course, be no dispute that the financial effect of electrification is the crux of the matter. A few days after the article had appeared in *The Investors' Chronicle* a contribution from a "Special Correspondent" appeared in *The Financial Times*, which was in almost identical terms, and about the same time Mr. Oscar Hobson, the City Editor of the *News Chronicle*, stated that "the companies during the last few days have allowed their views on electrification to leak out." There seems no reason to suppose, however, that the articles in *The Investors' Chronicle* or *The Financial Times* constitute a statement of official railway policy on the matter of electric traction, although as they are based on a commonsense appraisal of the merits and demerits of electric traction, they are not likely to be in direct conflict with it. On Tuesday last, *The Times* also published an article based on the same information. In a somewhat different strain was an article signed "by a Railway Executive," which was published in the last issue of the *Sunday Express*. That dealt with a number of suggested improvements for post-war railways, and certainly seemed more amusing than authoritative.

The Sierra Leone Government Railway

More than 50 years have passed since the scheme was taken in hand of building a light railway to serve the colony of Sierra Leone on the west coast of Africa. The country was difficult from the constructional viewpoint and numerous ravines necessitated building several steel viaducts in the first few miles from Freetown. The first section was opened from this point (Water Street) to Songo, a distance of 32 miles, in December, 1898. The line was extended to Rotifunk in 1900, to Bo in 1902, to Baiima in 1905, and to Pendembu (227½ miles from Freetown) in 1909. The first section of the branch from Bauya was opened to Roruks, a distance of 20 miles, in 1909; it was extended to

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Yonibana in 1912, and to Kambai (104 miles from the junction) in 1914. In July, 1930, the 21-mile section of this branch from Makeni to Kamabai was taken up and the track was converted for use as a motor road. The gauge of the line is 2 ft. 6 in., and it is single track throughout, laid with 30-lb. rails. Curvature throughout the system is heavy, and on the main line from Freetown to Pendembu a little over 40 per cent. is on curves, of which there are an average of five a mile. Except where the line leaves Freetown Station (and where a banking engine is used), the maximum gradient is 1 in 50. There are 114 bridges of 20 ft. span and longer, of which the longest is 716 ft. The wartime activities of the system are recorded this week, page 23.

Overseas Railway Traffics

From the returns available to June 24, 1944, the approximate figures of gross earnings of the British-owned railways in Argentina for the financial year just ended can be partly estimated. It will be seen from the accompanying table that each of the four larger companies has increased its gross takings. Improvements of £110,388 and £90,492 respectively are shown by the Argentine North Eastern and the Entre Rios. For the United Railways of the Havana the financial year also ends on June 30, and up to June 24 its aggregate gross receipts were £274,052 in excess of those for the corresponding period a year ago, when the remarkable advance of £991,847 was reported. The Taltal, unlike other British-owned railways in Chile, ends its financial year on June 30, and for the first 48 weeks it shows an advance in gross receipts of £13,954.

	No. of week	Weekly traffics £	Inc. or dec. £	Aggregate traffic £	Inc. or dec £
Buenos Ayres & Pacific* ...	52nd	98,460	+ 17,460	5,584,020	+ 455,640
Buenos Ayres Great Southern*	52nd	133,200	+ 8,700	9,034,860	+ 769,920
Buenos Ayres Western* ...	52nd	69,300	+ 17,080	2,949,240	+ 155,160
Central Argentine*	52nd	153,888	+ 54,960	7,918,362	+ 1,164,961
Canadian Pacific	25th	1,213,200	+ 92,800	29,111,200	+ 3,519,000

* Pesos converted at 16⅔ to £

Aggregate net earnings of the Canadian National Railways for the first five months of 1944 amounted to £6,509,600, a decrease of £603,800 in comparison with the corresponding period of 1943.

The Ballycastle Railway

Recently Mr. P. Agnew, M.P. for S. Armagh in the Parliament of Northern Ireland, gave notice of a question to Mr. Lowry (the Minister of Home Affairs & Security) whether negotiations had taken place with the L.M.S.R. with the aim of having a broad-gauge (5 ft. 3 in.) line laid between Ballymoney and Ballycastle. The existing line of 16 miles on the 3-ft. gauge was opened in 1880 as an independent undertaking under Irish light railway powers, and the former Belfast & Northern Counties Railway Company, with whose main line the Ballycastle Railway connected at Ballymoney, subscribed £18,000 and in virtue of that subscription appointed two directors. When the Belfast & Northern Counties Railway was acquired in 1903 by the former Midland Railway Company this power of appointment was continued to the purchaser, although the line still remained independent. Because it was found impossible to carry on the business except at a loss the directors decided early in 1924 to discontinue the working. This stoppage was only temporary, as arrangements were made with the Northern Counties Committee of the L.M.S.R. to work the line as from August 11, 1924, subject to sanction being given by the Parliament of Northern Ireland to the purchase of the line. This acquisition was authorised by the L.M.S.R. (Ballycastle Railway Vesting) Act, Northern Ireland, 1924. No negotiations as to gauge have in fact taken place.

South African Railways & Harbours in 1943

The total earnings of the combined railway, harbour, steamship and airway services of the South African Railways & Harbours during the calendar year 1943 amounted to the record figure of £52,877,394, of which £49,826,737 was required to meet working expenditure, leaving a gross surplus of £3,050,657. Revenue showed an increase of £2,848,086 over that earned during 1942; but expenditure rose by £5,325,598, mainly because of improved rates of pay, increased cost-of-living and other allowances paid to the staff, and higher cost of materials. Including the net surplus of £2,103,431 brought forward from the previous year, and after allowing for ordinary appropriations from revenue amounting to £1,757,501, and special appropriations of £2,724,589, there remained a net surplus of £671,998 to be carried forward. At December 31, 1943, the credit balances of the funds controlled by the Railways & Harbours Administration were: betterment fund, £3,556,983; insurance fund, £2,025,025; renewals fund, £13,965,385; institutes fund, £120,705; guarantee fund, £52,522; rates equalisation fund, £7,472,927; pension and superannuation funds, £35,547,075; and sick fund, £19,752. The sum of £2,724,589 referred to above as being for special appropriation to the rates equalisation fund had not been credited at December 31, 1943, otherwise the balance of that fund would have been £10,197,516.

Transandine Railway Traffic Resumed

After an interruption of ten years, through traffic on the reconstructed Transandine Railway was resumed on March 24. Earlier dates had been announced, but apparently proved impracticable, and even now it is by no means clear how frequent or regular is the service. The timetable which was introduced on March 25 (the day after the opening ceremony) provided for an international passenger service limited to one train a week, and for a daily goods service. The section now restored to traffic is that from Mendoza to Punta de Vacas. On the portion between Mendoza and Uspallata, two passenger trains a week are scheduled. Under an agreement of May 13, 1923, the Argentine and Chilean sections of the metre-gauge Transandine Railway, totalling about 155 miles, had been under a joint administration, but in December, 1932, the Buenos Ayres & Pacific Railway Company provisionally resumed working the Argentine section. During the ten years that the line was closed, formalities were completed for the purchase by the Argentine Government of the section in Argentina, and these were concluded at Mendoza in October, 1939, when the line was finally incorporated in the Argentine State Railways system.

Modern Practice with Wayside Stations

Railway station construction and reconstruction will necessarily become very live topics at the conclusion of hostilities in Europe, partly because of widespread war damage, and also by reason of some five years of obsolescence and often inadequate maintenance. Recently, we have received quite a number of requests from various parts of the world for information about modern British station practice, and this week we publish a description of the new L.M.S.R. station at Luton, upon which work was begun in 1938, and not completed until June, 1940, after the outbreak of war. This station is typical of the best modern British practice with wayside stations and the description of the work, both from the architectural viewpoint, and also in relation to traffic operating layout, should prove of interest and guidance. The peculiarities of the site had a marked influence on the design of the station, as a high-level footbridge, which connects the two sections to Luton Town and passes above the railway line, has been taken as the level for the main entrance and booking hall. Such arrangement has advantages even in more normal circumstances. Passenger amenities have obviously been planned after considerable thought and bearing in mind not merely the present requirements of the town, but also allowing for the traffic development which its increasing industrialisation makes probable.

Diesel Traction Policy in Tasmania

Diesel traction on the Tasmania Government Railways commenced early in 1937, when two 75-h.p. Drewry petrol-engine cars were converted to diesel propulsion. The success which attended this step resulted in further petrol cars being fitted with diesel engines, and it was decided to embark on a policy of adopting diesel power for all railcar work. In 1938 orders were placed for four diesel solo-cars and two two-coach sets, which were put into service in July and August, 1939. These six vehicles now cover the bulk of the railcar mileage on city-suburban and north-south main-line running, and the older converted cars are used on outlying branches. Of the newer vehicles, four are powered by Gardner 6 LW direct-injection cold-start engines, and two by 6L3 153-b.h.p. engines of the same make. The bodies and lightweight trailing bogies are Australian built, but the power bogies, control gear, and cooling equipment were supplied by the Drewry Car Co. Ltd., which recently executed a repeat order for five of the larger-type power-bogie sets and one spare bogie, for which bodies and trailing coaches are under construction in Australia. To November last the six coaches have aggregated 1,143,000 miles, with individual totals ranging from 163,000 to 217,000 miles. An article on diesel operation in Tasmania appears in the current issue of *The Railway Gazette, Diesel Railway Traction Supplement.*

Wasted Pullman Space in Wartime

Notwithstanding present war travel congestion, space is still being wasted in American trains as a result of Pullman sleeping car reservations not being taken up before the departure of

trains, or of cancellations being received too late to permit of re-sale of the space. Some check has been placed on this practice by the rule that space must be paid for in advance, and that no refund is permissible unless cancellation is received in time for the space to be re-sold, but, as pointed out in an editorial note on p. 586 of our June 9 issue, this has not proved a complete cure, for wealthy corporations or individuals are quite prepared to write off the loss so sustained if they or their representatives decide at the last minute not to travel. Of this abuse a striking example recently has been brought to light. A Chicago business man and his lawyer had reserved space on the "Liberty Limited" sleeper of the Pennsylvania Railroad from Washington to Chicago, which they neither used nor cancelled, but in respect of which, nevertheless, they claimed a refund; and on receiving a refusal, they appealed to the Interstate Commerce Commission. On inquiry by the latter, it was revealed that on the night in question this popular express, for which there was a long waiting list of prospective travellers, and to which three extra sleeping cars had been attached to increase the accommodation, went out of Washington with 57 vacant places, due to cancellation too late for re-sale, or non-appearance of those who had reserved places. The Pullman Company's decision not to refund in such cases, authorised by the I.C.C., has certainly made available hundreds of thousands of places to wartime travellers, but even so the wasted space evil has not been fully checked.

Seeking the Passenger's Opinion

A good deal is being done in the United States at the present time to elicit direct from the passenger his opinions concerning the service offered him by the railways, so that in the intensified competitive conditions of the post-war period the railways may be as thoroughly prepared as possible to hold their own. Recently, on many of its principal trains, including the "Empire State Express," "Pacemaker," "Mercury," and others, the New York Central System has been circulating an illustrated pocket-size questionnaire, attractively got up, entitled "The Post-War Railroad Coach as I Would Like It," which invites passengers to give their replies to about 60 questions, mostly by a simple "yes" or "no." The questions relate to coach travel—the equivalent of British third class—and include such matters as seating, windows, lighting, air conditioning, smoking, interior decoration, radio, ticket collection, exterior finish of trains, and such special service as that rendered by porters, valets, maids, and stewardesses. All the questions concern comfort and general enjoyment of travel, and no attempt is being made to include technical matters connected with coach design. This New York Central enterprise follows a recent experiment of the Boston & Maine Railroad, in which a specially-designed adjustable chair was installed in Boston North Station, and the reactions of some thousands of passengers to various adjustments were recorded by anthropological experts in order to evolve an average in seat design that would bring a maximum of travel comfort to the largest number of passengers.

Telephoning to and from Moving Trains

In the present issue appears a short general account of the train telephone system in use on the Pennsylvania Railroad's Trenton—Stroudsburg line. Apparatus of a similar kind has been used elsewhere in America and the idea of communicating with a moving train is long-standing. The Edison-Phelps induction telegraph was in use nearly 60 years ago. The present systems are of two general kinds. One is intended to serve railway purposes only and provide communication between driver and guard on trains and stations and control offices. The other is to provide communication beyond the railway and enable persons on the train to speak to ordinary telephone subscribers or others remote from the route. Both have their uses. We should be inclined to say that our British railway conditions would not call for a general use of these devices, but that in certain instances they would be helpful. We hesitate to say who was the first to instal something, as our experience is that history has many surprises in these matters. Radio train telephony was much experimented with in Germany after the last war and a public service was inaugurated on the Berlin—Hamburg line on January 7, 1926. Business men could speak from the expresses to another train or to any point connected with the public service telephone system. A paper describing all the development work was read at the Seddin exhibition in 1924.

Limiting Locomotive Weight

The incessant increase in the weight of the steam locomotive is at last beginning to arouse some concern among responsible railway officers in the United States, which is hardly surprising, as some of the latest articulated examples weigh, with their tenders, over 500 tons apiece. "The poor iron horse," said Mr. K. F. Nystrom of the Chicago, Milwaukee, St. Paul & Pacific in a recent address to the New England Railway Club at Boston, "in the past two decades has been overburdened with too heavy a harness in the form of various devices so that his total weight is all out of control. It is hoped that some individual or company will take real pity on the faithful old horse, and put him in a functional harness and get him back in the running . . . I am of the firm conviction that if a determined courageous effort were made to improve the steam locomotive radically, it would yield gratifying results." The most obvious problems are those of boiler construction, lightweight reciprocating parts, and a correlated system of spring suspension. The final outcome of such an undertaking would probably be a high-pressure boiler and steam turbine, with direct drive. Among other interesting points in this address was the calculation that it is profitable to pay at least $1 for every lb. of weight that can be economised in locomotive or coach building, and that this figure is probably conservative in the case of high-speed equipment. In any event, research directed towards the improvement of the steam locomotive may become more than ever necessary in the future if the demand for internal-combustion engines in other fields should limit the development of diesel power for railway transport purposes by reason of shortage or the high price of oil fuel.

Revision of Railway Control Agreement Refused

AS reported in our Parliamentary Questions on page 26, the Minister of War Transport has declined to revise the financial provisions of the Railway Control Agreement in favour of the stockholders. Although this decision will come as a disappointment to a large number of stockholders, it is hardly surprising in the circumstances. It will be remembered that in March last at informal meetings held at the close of the annual general meetings of the four main-line companies, resolutions were carried by the stockholders requesting the boards to express to the Minister of War Transport and through him, to the Chancellor of the Exchequer, the opinion that the agreement is inequitable in its operation in the changed circumstances which have developed since 1941 and should now be revised to enable the companies to revise the standard revenues fixed under the Railways Act, 1921. Three of the railway chairmen expressed no views on the stockholders' action; Sir Edward Cadogan reminded Great Western Railway stockholders that, although the present earnings are much greater than was expected at the time the agreement was made, they are to a large extent artificial as they depend largely on measures taken by the Government in the national interest. He also pointed out that abnormal circumstances might arise which would have a material bearing on the earnings of the standard revenues in the years which lie ahead, and that any request for a revision on the ground of increased earnings might have unfortunate repercussions in the event of earnings decreasing.

Subsequently, the railway Chairmen saw the Minister of War Transport and, as is indicated by the correspondence published on page 25, conveyed to him the representations of their stockholders for a revision of the financial terms of the railway control agreement on the ground that the extension of the area of the war at the end of 1941 constituted a case for its revision. This revision, it was suggested, should be by means of an increase in the guaranteed annual payment and some adjustment of the maintenance charges to cover the intensified user of maintainable assets. The Minister has now replied, however, that the revision of the agreement in 1941 relieved the railways of uncertainty as to the effects of the war on their net revenues, and that the Government is unable to regard the extension of the war area as a reason for revision, or to agree to any increase in the fixed annual payment. So far as abnormal wear and tear is concerned, he pointed out that the agreement already provides for an additional allowance, over and above the basic figure for maintenance, to be made in this respect, and agreed to consider any grounds advanced as a justification for the granting of such an allowance.

Although the Minister's refusal to increase the fixed annual rental will doubtless prove disappointing to many stockholders, particularly those holding L.N.E.R. junior stocks, on the other hand, it will be tempered by the agreement of the Minister to consider the companies' claim for an additional allowance in the maintenance charges for the abnormal wear and tear of maintainable assets if the companies can justify such a claim. This, however, can hardly be termed a generous gesture on the part of the Minister as Article 11 of the Railway Control Agreement provides that the Minister may agree to the inclusion of additional maintenance allowances in respect of wear and tear which can be shown by the undertakings to be abnormal compared with the base period.

The tremendous load the railways have been carrying com-

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pared with pre-war obviously must have caused abnormal wear and tear of such assets as locomotives, rolling stock and permanent way. We imagine, however, that it may prove extremely difficult to assess with any degree of accuracy its extent, having regard to the many conflicting considerations involved. We understand that the companies are formulating their claim but it should be pointed out that, even if the Minister is satisfied that the companies have proved their case, any increase in the maintenance charges he may authorise will not be available for distribution as dividends to stockholders. The companies will merely be empowered to charge additional sums for maintenance and any balance not expended currently will be transferred to trust funds on the lines indicated in Articles 19 to 25 of the Railway Control Agreement for the purpose of enabling the companies to overtake their arrears of maintenance when adequate supplies of labour and materials again become available.

Indian Railways in 1942-43

THE report by the Railway Board on Indian railways for the year ended March 31, 1943, opens with the usual survey of the agricultural position, so vital to the whole sub-continent and to railway traffics in particular. The monsoon, on which this industry depends, was one of the best and steadiest in recent years, with the result that, apart from decreases of 3 and 26 per cent. in rice and cotton, respectively, all other crops showed improved figures as compared with the previous year; jute and castor (oil) seed provided yields 66 and 62 per cent. greater than in 1941-42. Partly for this reason, but mainly thanks to war traffic, railway earnings again established a new record. Gross traffic receipts of State-owned and of State-worked lines totalled Rs. 155·48 crores (= Rs. 15,548 lakhs or £116,610,000),* as compared with Rs. 135·17 crores in the previous year, an increase of Rs. 20·31 crores or 15 per cent. On the other hand, ordinary working expenses amounted to Rs. 68·98 crores or under 45 per cent. of the gross earnings, and a figure only Rs. 5·44 crores in excess of that for 1941-42 to offset the Rs. 20·31-crore increase in earnings. Net traffic earnings were thus Rs. 86·50 crores, or, if the sum of Rs. 12·58 crores set apart for depreciation be deducted, the figure becomes Rs. 73·92 crores. Account must, however, be taken of two other comparatively small sums, namely Rs. 2·70 crores paid to worked lines as their share of earnings, and Rs. 1·89 crores profit on miscellaneous transactions; taken together these necessitate a deduction of Rs. 0·81 crore, so that the net revenue available was Rs. 73·11 crores. As interest charges on capital amounted to Rs. 28·04 crores, a final net surplus of Rs. 45·07 resulted. This sum was distributed between credits to (*a*) general revenues of the Government of India (Rs. 20·13 crores), (*b*) the Depreciation Reserve Fund, in full payment of the loan previously taken (Rs. 16·08 crores), and (*c*) the Railway Reserve Fund (Rs. 8·86 crores).

The enhanced earnings in the year under review were due not to a larger number of passengers or volume of goods carried, but to longer leads in both cases, and more particularly to substantially increased military traffic. Other factors contributing to the higher revenue were (1) a change in the composition of goods traffic involving a shift of the centre of gravity towards higher-rated traffic, (2) withdrawal of reduced and concessional rates and fares, and (3) basic fare increases on the North Western and East Indian Railways. It should be noted that the large increase has occurred despite reduced passenger services, a deliberate curtailment of non-essential goods traffic, and a widespread campaign against unnecessary travel. To illustrate these facts it may be mentioned that as compared with 1941-42 the number of passengers carried fell by 0·13 per cent., but the passenger-mileage increased by 9·84 per cent., and passenger earnings by 22·95 per cent. Passenger lead increased by nearly 12 per cent. Similarly, the tonnage of freight carried was lower by 1·75 per cent., but the net ton-mileage, goods earnings and lead went up by 0·23, 8·45, and 2·08 per cent. respectively.

The most remarkable change on Indian railways during 1942-43 was due to a complete reversal of their functional policy as a result of the Japanese threat to the North East Frontier. Instead of devoting all their energies to assisting other departments with men, munitions, and supplies of all kinds, they were required to concentrate on the provision of transport for operational needs. A scheme for the militarisation of certain railways in the East and South of India was put into force, and a large number of railwaymen appeared in khaki uniforms. Officers had to be recalled from military service and from service in other Government departments, and whenever it was found that munitions work in any way affected the normal repairs and maintenance of the railways, that work was discontinued. One whole workshop previously engaged on munitions production resumed its normal railway functions, but despite this there still remained surplus capacity in railway shops, and at the end of the year over 20,000 railway employees continued to be engaged solely on munitions production. The Railway Priorities Organisation under the War Transport Department expanded, and civil traffic was increasingly controlled in the interest of the war effort.

In some parts of India the railways suffered severe and widespread damage from sabotage engendered by the Civil Disobedience Movement. All railways were affected; stations were burned, telephone and telegraph lines cut, signalling and block instruments destroyed, trains set on fire, track tampered with, and derailments caused. On the Bengal & North Western Railway in Bihar practically every station was damaged. In all, 276 stations were attacked within a period of seven weeks and there were 45 derailments, figures which had grown to 328 and 63 respectively by the end of the year. Over half a crore of rupees worth of damage was done, excluding cost of goods damaged and looted. The four most serious deliberate passenger train derailments together caused 36 deaths and 135 injuries. Night running had to be stopped on some sections of line, and traffic was seriously affected throughout India. On the broad-gauge lines wagon loading fell from 11,600 to 9,700 a day, and passenger services had to be curtailed all over the country as coal traffic was materially affected. The railway staff loyally remained at their posts throughout the disturbances despite great difficulties and danger. One George Medal and 32 Commendations for brave conduct in the face of danger were awarded to railwaymen.

Three more company-owned railways were purchased by the State during the year, two of them, the Bengal & North Western and the Rohilkund & Kumaon, being Class I lines. They were handed over and brought under State management on January 1, 1943, and the two systems were amalgamated as the Oudh & Tirhut Railway. Practically the whole of the staff was taken over by the State. The combined mileage of the new system is 2,775 route-miles, all of metre gauge, and the rolling stock transferred consisted of 439 locomotives, 1,762 carriages, 13,941 wagons and 13 steamboats. The other line acquired by the Government was the Mirpurkhas—Khadro metre-gauge section in Sind, which was amalgamated with the British section of the Jodhpur-Hyderabad Railway on December 31, 1942. In addition, notice was served of the State's intending purchase of two other companies' lines, the Guzerat Railways and the Dhond-Baramati Railway on March 31 and September 30, 1944, respectively. Both are narrow-gauge railways. The Guzerat lines comprise three sections 30, 25, and 29 miles in length, worked by the Bombay, Baroda & Central India Railway, which continues to work them as State lines. The Dhond—Baramati line is 27 miles long and is and will continue to be worked by the Great Indian Peninsula administration.

Though no new lines were sanctioned for construction or completed during the year, the important Nokkundi—Zahidan section, 137 miles in length and of 5 ft. 6 in. gauge, was reopened for traffic on May 10, 1942. It may be remembered that this was the western section of the Indo-Persian line completed during the last war for strategic reasons, but subsequently closed due to lack of peacetime traffic. In this war, however, its urgent need soon became apparent as one of the channels through which supplies could be sent to Russia by the Allies; it terminates in Persian territory, and Zahidan is connected with the Trans-Caspian Soviet railway by a motor road. Five more branch lines were closed during 1942-43, as well as the Khanai—Zardalu section of the Sind—Peshin railway in Baluchistan. It is significant that during the year under review the capacity of the metre-gauge Pandu—Manipur Road section of the Bengal & Assam Railway was increased by the provision of eleven additional crossing stations, a measure that is doubtless of considerable value in the conduct of the military operations on the North East Frontier at the present time. Another interesting point revealed in this respect is that, in accordance with the policy of the Priorities Control, mentioned above, wherein co-ordination of rail traffic with other forms of transport is secured, the large fleets of river steamers on the Brahmaputra and Ganges rivers and the railways in Eastern Bengal and Assam are being worked, to all intents and purposes, as one transport system to form adequate lines of communication for the Japanese campaign.

A welcome announcement is that during the year substantial additions to the over-worked rolling stock of the Indian railways were in prospect, the following vehicles being on order in March, 1943:—

	Broad Gauge	Metre Gauge
Locomotives	170	5
Coaching stock	538 units	421 units
Goods stock	4,114 ,,	1,293 ,,

a unit being the equivalent of one four-wheel vehicle. Though restrictions on the supply of steel continued in force, the Tata Iron & Steel Co. Ltd. was able to supply a considerably greater

* Rs. 1 crore = Rs. 100 lakhs = £750,000

tonnage of rails and fastenings than in the previous year, namely 52,990 tons of rails and 1,770 tons of fishplates.

The scheme for the training of transportation troops initiated by the railways during the previous year for employment on military lines of communication continued, and by March, 1943, 21,000 trainees had been handed over to the military. The training of technicians also proceeded steadily, the average number of men under training at any one time being about 6,000. In addition, a Railway Military Units (Defence of India) scheme was introduced at the suggestion of the War Department, whereby the staff on certain railways was organised on a military basis, due to the threat of invasion. The men enrolled voluntarily to serve on their own railway under the railway officers, but were also given elementary military training. Allowances of extra pay and the army scale of ration allowance were granted as well as a field service allowance and modified uniform. During the year recruitment for the superior services (officers in the various departments) of State-managed railways was 97½ per cent. Indian and 2½ per cent. Anglo-Indian or Domiciled European. No Europeans were recruited. Even on company-worked lines only 6·7 per cent. of the recruitment was European and 93·3 per cent. Indian. Though the war has doubtless affected these figures, it is significant that, with almost all the more important lines now State property, European recruitment has virtually ceased, and Indianisation is rapidly increasing. Apart from a small number of specialists, possibly, this policy seems likely to continue after the war. Of a total staff of all grades on Indian railways on March 31, 1943, of over 826,000, only 1,833 were Europeans, or about 1 in 450.

▪▪▪▬

The Development of the Track Circuit

NO single fundamental invention has contributed more to the evolution of the art of controlling the movements of trains by signals than the closed track circuit, produced by William Robinson in America in 1871; that is, a track circuit in which the current is flowing normally, the presence of a pair of wheels forming a short circuit and diverting it from the so-called track relay, the purpose of which is to reflect the condition of the section of track covered by the circuit and in turn to act on the other signalling apparatus in use. This invention provided the means whereby a train, or even a single vehicle, could give evidence of its presence throughout its journey between stated points, affording a continuous control over the signalling system, instead of the intermittent control, in evidence in automatic signalling proposals previously brought forward and in lock-and-block systems shortly afterwards. From then until now the main principle of Robinson's proposals has remained unchanged and nothing has been found which, using equally simple apparatus, can take its place and offer the same facilities.

The closed track circuit, while functioning on correct lines when unoccupied, has to be operated by a vehicle to give the danger condition by making contact, not breaking it, contrary to the principles ordinarily adopted with all other safety devices. This is because no other course, as yet, has proved practicable, although experiments have been made with the object of constructing a "magnetic" track circuit which would not depend on establishing contact between wheel and rail. We believe it proved practicable to work a very short length in this way, but nothing further was heard of the plan, to our knowledge.

The development of the track circuit from its introduction by Robinson consisted at first in perfecting its components and learning the way to adapt it and then to the various conditions met in practice, including the vital requirement of ensuring that the shunt should always be effective. It was not possible to do this, in some exceptional circumstances, and signal engineers had to provide the best alternative equipment they could. In most, however, some modifications in the values of relay resistance, feed voltage, etc., with an occasional resort to secondary relays, enabled reliable working to be achieved. With the introduction of alternating current apparatus new problems arose and were successfully met, the adaptation of the track circuit to electric railways, with use, if required, of both rails for the traction return, constituting a step forward of the greatest practical value, on which much other signalling work of importance has been based. In all this work, however, steady energy, flowing all the time, through the relay or the shunt, was still the rule, and Robinson's essential idea remained unaffected. Here and there, however, where the plan was practicable and offered advantages, energy was applied only when it was desired to prove the condition of the track before admitting a train to the protected section, thus making use of the so-called prevent shunt value.

About ten years ago there appeared in America a new development which became called the coded track circuit, in which the energy supply was continuously interrupted at a pre-determined rate, or rates, the track relay following suit; its movement is proved by apparatus able to detect it, in its various forms, and act on the other signal equipment in the appropriate manner. By this arrangement the danger indication is obtained should the track relay remain still, in either position, and the fear of extraneous current maintaining the relay energised, the anxiety of the early years of track circuiting, is thus neutralised. The most interesting feature of the coded track circuit is probably its power to make the rails serve as a path for several controls and enable them to be established without the aid of line wires. This feature has been developed in a very interesting way in America, in several important installations, and undoubtedly under certain conditions it is an attractive facility. As yet, we believe, nothing but experiments have been made in Great Britain with the coded track circuit and it was therefore of great advantage to members of the Institution of Railway Signal Engineers to hear on June 28 a paper on its theory and applications by Mr. J. P. Coley and Mr. R. M. Macgregor, who are particularly qualified to deal with the subject.

▪▪▪▬

A Battle of the Gauges Centenary

BEFORE the opening of the broad-gauge Bristol & Gloucester Railway on July 8, 1844, the battle of the gauges as a national problem had been an abstract matter, confined to argument. The experience of the interruption to through working, however, at the break of gauge between this line and the Birmingham & Gloucester Railway at Gloucester (particularly after September 2, when goods traffic was begun), brought reality to the battle, and quickly made history, as the Gauge Commissioners were appointed in July of the next year. This comparatively small line had already had an interesting history. An Act of June 19, 1828, had incorporated the Bristol & Gloucestershire Railway Company and authorised the 9 miles from Bristol to Coalpit Heath (Westerleigh). This was opened as a horse tramway from Coalpit Heath to a junction with the Avon & Gloucestershire Railway at Mangotsfield in February, 1832, and from Mangotsfield to Bristol on August 6, 1835. By the beginning of 1833, the B. & G. had already found its feet sufficiently to become one of the "parents" of the G.W.R.

On July 1, 1839, Parliament sanctioned an extension of the line from Westerleigh to Standish Junction (7¼ miles from (Gloucester) where it would join the Cheltenham & Great Western Union Railway—a line closely allied with the G.W.R. from its inception, and the name of the early railway was changed to the Bristol & Gloucester Railway. In 1843, when the G.W.R. agreed to absorb the C. & G.W.U., the company became alarmed at having the broad gauge on all sides and, after considerable hesitation, decided to adopt the broad-gauge. This naturally pleased the G.W.R., which agreed to allow the use of its stations at Bristol and Gloucester, and built the section of line for the B. & G. trains from Standish Junction to Gloucester, although it was then isolated from the G.W.R. system. On the other hand, the G.W.R. would seem to have been uncertain of the relationship, for, although it had agreed to work the Bristol & Exeter Railway when that undertaking was in a similar position, the G.W.R. refused to supply locomotives and rolling stock for the B. & G. which then had to approach a contractor.

Before the end of 1844 complaints from the public led to the managements of the Bristol & Gloucester and the Birmingham & Gloucester Railways reaching an understanding that the two lines would come under one management from January 1, 1845, and that Parliamentary permission to amalgamate as the Bristol & Birmingham Railway would be sought. Negotiations for purchase by the G.W.R. broke down on a difference of £5 a share, and through the foresight of Ellis, the Midland Railway Company's Deputy Chairman, agreement for that railway to absorb both lines was signed on February 8, 1845. Thus the B. & G. returned to the narrow-gauge side, but, because of the 1843 agreement with the G.W.R., the broad-gauge metals remained until 1872. The Midland Railway worked broad-gauge services until the narrow-gauge lines (authorised in 1848) were brought into use in June, 1854. The Gauge Commissioners remarked in their report that "Gloucester was the only place where the break of gauge existed," and there is no doubt that what they noticed there must have influenced them greatly. Although there is no real doubt that the break of gauge did cause some difficulty, there are strong reasons for believing that the so-called narrow-gauge party (advocating the universal adoption of the present standard of 4 ft. 8½ in.) deliberately magnified the difficulties and indulged in really extensive propaganda, under cover. Some details were given by Mr. Kenneth Brown in an address to the Railway Club summarised on page 24.

The Scrap Heap

The Ministry of Information, like the black-out or fire-watching, is one of the unavoidable horrors of wartime. Its funeral would be an occasion for rejoicing.—*From "The Evening Standard."*

* * *

"WHAT AN EXPERIENCE"

The awe with which some of the junior members of the staff of a railway department regard their Chief is indicated by the following conversation which actually took place between two office boys, one of whom was sent to the home of a chief officer during the latter's convalescence, in order to get letters signed.

"Where you been ?"
"To the boss's house with letters."
"Go on ! Did 'e speak to you ?"
"Yes."
"Never ! Wot did e' say ?"
"Asked me if I'd got a bike."
"Coo ! Wot you say ?"
"Yessir."
"Did 'e say anything else ?"
"Said he supposed I was getting to know my way up there."
"Golly ! Wot did you say ?"
"Yessir."
"Did 'e say anything else ?"
"No."
"Coo-o-o ! ! ! Wot an experience though ! ! !"

* * *

A RAILWAYMAN'S CACHE

Police searched a railwayman's house, and in a specially prepared recess in the roof found 61 quart bottles and five pint bottles of whisky, bottles of brandy, gin, rum, port and sherry, and also soap, coffee and plums.

The railwayman, a driver, who admitted stealing goods worth £125, was at Edinburgh Sheriff Court sentenced to eight months' imprisonment.

A railway fireman, who was said to have admitted selling a five-gallon jar of whisky in London for £50, was also sentenced to eight months' imprisonment for stealing goods worth £239.—*From "The Star."*

* * *

STEEPEST U.S.A. GRADIENT

The steepest main line gradient in the United States is reputed to be the Saluda Hill on the Columbia-Asheville line of the Southern Railway System in North Carolina, which is inclined at 4·7 per cent., or 1 in 21¼. All trains up the grade require to be banked, even though the freight trains are hauled by articulated 2-8-8-2 locomotives of considerable power; banking is performed by 2-10-2 and other types. Protection against runaways is provided by spring safety switches with lengthy trap sidings.

* * *

HAS RAILWAY, BUT NO TRAINS

Eye—Britain's vest-pocket borough in Suffolk—has 1,733 citizens, and they are seething with anger. They have a railway station, crossing-gates, signals, and three miles of railway track—but no trains. So they are going to petition to Parliament about it.

The trouble started when the L.N.E.R. knocked the smallest borough out of "Bradshaw." "We cannot run a train service except at a loss," the company informed the corporation. "And we cannot see any prospect of reinstating it."—*From "The Daily Mirror."*

* * *

At the War Services Exhibition, held recently at Lahore (India), the North Western Railway displayed bridging pontoons made in the railway workshops; and there were demonstrations by trainees of the N.W.R. Civil Training Centres, at which many thousands of boys from the villages have been trained as blacksmiths, tinsmiths, electricians, armature-winders, fitters, upholsterers, painters and polishers. One exhibit was a model balloon barrage designed by Mr. H. J. Mulleneux, Chief Electrical Engineer, G.I.P.R., and made in that system's workshops. The exhibition covered 15 acres.

* * *

A Liberty ship, now under construction in the yards of the California Shipbuilding Corporation, Wilmington, California, will be named the *Horatio Allen*, after the man who supervised the building of, and drove, the *Stourbridge Lion*, the first locomotive to be run in the U.S.A. The locomotive was purchased in England for the Delaware & Hudson Canal Company's railway, and the first trip was made at Honesdale, Pennsylvania. Horatio Allen, who was born at Schenectady, New York, in 1802, was at one time Chief Engineer of the South Carolina Railroad, and in 1843 was President of the Erie Railroad.

* * *

NO SWASTIKAS ON THE G.W.R.

A train full of German prisoners of war pulled in at a G.W.R. station with two black swastikas on the windows of one coach.

The station inspector took a look inside, and found two more swastikas on the off-side windows. Off he went to find the officer in charge of the prisoners. Asked why the swastikas were displayed, the officer replied: "Oh, they only want to keep the old home atmosphere a bit longer."

"Maybe," said the inspector, "but this train does not move out of the station until they are removed."

In less than no time they were.

* * *

RAILWAY SERVICE

Corporal Ronald Arthur Drew, D.C.M., belongs to a family which has had its name on the paysheets of the Victorian Government Railways for over 60 years. His great-grandfather was Solomon Drew, a ganger in the Way & Works Branch, who was killed near Birregurra in 1889. Solomon Drew was the father of eleven children, five of whom—Thomas, Solomon, William, Henry and Cyril—joined the service; his widow became a gatekeeper at Geelong. Thomas Drew, who was a ganger, is the parent of C. T. Drew, of the Way & Works Staff Office, and grandfather of Corporal Drew. Solomon Drew, formerly a motorman, has retired, and William, formerly Yard Foreman, died recently; but two other brothers, Henry and Cyril, both guards, are still with the Railways Department. Another son of Thomas Drew, William, is in the control room at Seymour, and Corporal Drew's brother, Leslie Charles, of the R.A.A.F., was a lad labourer in the Way & Works Branch before enlisting.

* * *

TAILPIECE

(Increased statutory powers are being sought for railway police)

The Railway Police are in the news
For doing splendid work.
No matter where their duty lies
They will not flinch or shirk.

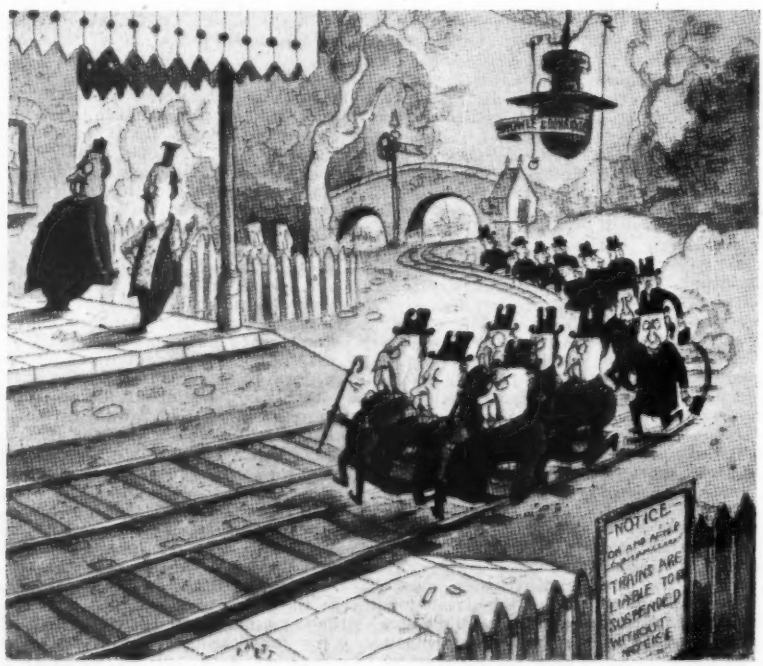
The war, alas! has given rise
To grave delinquencies,
And pilfering is on a scale
That peacetime seldom sees.

The Railway Police are highly trained
To deal with the offender,
And act with tact and vigilance
In things that crime engender.

Courageously they man their posts
When bombs and shells are falling.
Their zeal no tribute can express,
They're loyal to their calling.

Give praise then to the Railway Police
Who safeguard trains and stations,
And help the railway companies
To foster good relations.

W. E. N.



"'Ere's the 9.15. I see they've took it off"

[*Reproduced by permission of the proprietors of "Punch"*]

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

SOUTH AFRICA

Capital and Betterment Estimates

On April 17 the Minister of Transport announced the estimates of expenditure on capital and betterment works of the South African Railways & Harbours for the year ending March 31, 1945. The following are the amounts involved from loan and betterment funds :—

	£
Railway construction	153,863
New works on open lines	4,419,591
Rolling stock	324,609
Road motor services	18,500
Harbours	2,489,264
Airways	250,700
Working capital	25,230
Unforeseen works	250,000
Total	£7,931,757

In addition, expenditure chargeable to renewals fund and working votes is estimated at £6,197,887.

Of the estimated expenditure on railway construction of £153,863, £35,000 is to be spent towards the building of a line between Canada and Thomolong (estimated at a total cost of £167,728) ; £9,589 towards a line from Hercules to Koedoespoort (total cost estimated at £263,723) ; £30,000 towards a line from Springs to Welgedacht (estimated total cost, £107,751) ; and £79,274 towards an extension from Village Main to Faraday Street, Johannesburg (estimated total cost, £203,274).

The diversion of the Salt River Canal at Cape Town is estimated to cost £60,000 ; of this amount, £5,000 will be absorbed by work to be carried out in the current financial year. A sum of £15,000 will be required from loan and betterment funds for the reclamation at Port Elizabeth of the foreshore from North Arm to Edgar Street, which has been undertaken at a total estimated cost of £315,039.

The total expenditure on permanent way in the ensuing year is to be £2,001,400 and includes £453,586 for additions and improvements ; £1,014,203 for relaying and strengthening of track ; and £332,244 for regrading and deviations.

A sum of £2,448,608 is to be spent during the current financial year on docks, harbours and wharves ; £114,221 on telegraphs and telephones ; £115,611 on bridges and culverts ; £1,943,527 on buildings, fixtures and grounds ; £185,308 on engine sheds and turntables ; £102,779 on railway electrification ; and £4,775, 749 on new rolling stock.

WESTERN AUSTRALIA

Locomotive Drivers' Strike

As the result of the suspension of a driver who refused to take one of the new Australian standard Garratt-type locomotives through the tunnel near Swan View (about 14 miles from Perth), a strike took place recently of drivers on the Western Australian Government Railways. A settlement was quickly effected and train services were resumed the next day. The Union concerned stated that drivers were complaining of the intense heat experienced on the Garratt locomotives while running uphill through the tunnel, and recalled the death of a driver which occurred some months ago in the same tunnel. According to the evidence at the inquest, on that occasion (some details of which were published in *The Railway Gazette* of May 14, 1943), the train concerned stalled in the tunnel. The train was double-headed and the driver who died was on the train engine ; and the medical evidence indicated that his death had been due rather to carbon monoxide poisoning than to the injuries which he sustained later as the result of the stalled train subsequently running backwards out of the tunnel and crashing into a dead-end. The claim of the Union was that the size and power of the new Garratts caused the intense heat of which complaint was made, and, further, that the working conditions on the Garratts were as bad as, or worse than, those on the engines of double-headed trains.

Commissioner's Reply

In reply to the Union, the Commissioner of Railways said that since the fatal accident referred to above all loads hauled uphill through the tunnel had been reduced, and double-headed trains had been eliminated. The loads fixed for the new Garratts were considerably less than those which would be hauled over a similar gradient where there was no tunnel. Trials were in progress with a view to improving the conditions, which involved the use of special air tubes on engines, and other devices. It was claimed by the Railways Department that, as a result of the action taken in reducing loads and discontinuing double-headed working, the danger had been eliminated ; and it was added that the tests in progress were to reduce discomfort to the enginemen. The load laid down for the new Garratts had been worked out to enable the quarter-mile length of the tunnel to be cleared in the uphill direction in 50 seconds.

Terms of Settlement

The terms of the settlement reached included provisions to the effect that uphill tunnel-working with the new engines should be discontinued until satisfactory tests had been made, and that no such test should be made except in conditions to be agreed between the Commissioner of Railways and the duly accredited representatives of the employees concerned.

UNITED STATES

More New Passenger Cars

The Louisville & Nashville Railroad is applying to the War Production Board for authority to buy 28 lightweight passenger cars, estimated to cost $2,000,000. If the application is granted, the order, which is for 20 passenger coaches, 4 tavern-lounge cars for light refreshment service, and 4 dining cars, will be placed with the American Car & Foundry Company. To reduce weight, construction is to be of aluminium, and the cars will have anodised aluminium sides.

The Denver & Rio Grande Western Railroad is considering the purchase of two new mail-baggage cars, two baggage-dormitory cars, four coaches, and two dining cars, ten vehicles in all.

Continuously-Welded Rail

The Denver & Rio Grande Western Railroad has completed the continuous welding of 17,000 ft. of track in the Moffat Tunnel of its subsidiary, the Denver & Salt Lake Railway. The rail, of 112 lb. flat-bottom section, was delivered in 40-ft. lengths to the east portal of the tunnel, where 25 rails at a time were welded into 1,000-ft. lengths ; the latter were slid in position in the tunnel on sleepers laid across the original track still in place. Inside the tunnel, each new rail was substituted for a corresponding length of old, and the 1,000-ft. lengths were then welded together on the site to make one continuous rail over the length mentioned. This single-track tunnel, which is the second longest in the United States, has a length of 6 miles 200 yd. ; and the intention is ultimately to have continuously-welded rail from portal to portal ; welding now completed extends to just over half the tunnel length. In the open, the longest continuously-welded rail is 6,982 ft. on the Delaware & Hudson Railroad.

Extending Rock Island C.T.C.

The Chicago, Rock Island & Pacific Railway is extending one of its installations of centralised traffic-control, at present from Polo to Trenton, Missouri, for the further 50 miles from Trenton to Allerton. The materials required, including searchlight signals, dual control switch movements, code apparatus, and a new section for the existing control machine, have been received from the Union Switch & Signal Company, and installation is proceeding by the railway's own forces.

SWITZERLAND

Goods Wagon Position

There was a considerable shortage of goods wagons on the Swiss Federal Railways during the autumn and early winter of 1943 ; increased requirements for the conveyance of cereals, potatoes, sugar beet, fruit, livestock and so forth, within the Swiss frontiers, absorbed a substantial number of wagons ; and an additional heavy demand for the import of vital commodities from abroad has imposed a heavy strain on the available rolling stock. According to a statement by the Federal Railways, a further 3,000 to 3,500 wagons a day would have been required to satisfy all demands. To quicken the turn-round of wagons, a vigorous campaign is in progress for the reduction of loading and unloading times.

From an announcement made by the Federal War Food Office in December last, it appears that the Federal Railways are unable to supply sufficient wagons for the conveyance of cereals inside Switzerland, as covered wagons are urgently required for other tasks, particularly the conveyance of imported commodities. As a result, no loading of cereals took place in Switzerland in the second half of December. In view of the difficult goods-wagon position, the military authorities issued an order early last January to the effect that wagons were not to be used for small consignments to be loaded by consignors, or for cattle, for journeys of under 5 km. (about 3 miles). These restrictions did not include consignments of cattle which were sent at fixed intervals.

ITALY

Conveyance of Wine

In connection with new maximum prices for wine in German-occupied Italy, which became effective from April 25 and were designed to check "black market" tendencies, it is stated that consignments have been moved to those districts where the highest "black market" prices can be fetched. In an attempt to end this practice, a wine distribution scheme has been introduced, and the authorities have been directed to seize any unauthorised consignments of wine, also the tank wagons, as a preliminary step to legal action. The rolling stock concerned is mostly privately-owned, and it is reported that only a limited number of wine tank-wagons is available in northern Italy ; many of the Italian United Wine Company's wagons are stated to have been damaged by bombing.

Brake Equipment and Braking Tests of Southern Railway "CC" Electric Locomotive*

Summary of a paper by L. Lynes, M.I.Loco.E., and A. W. Simmons, A.I.Loco.E., and the ensuing discussion

THE locomotive, which weighs 99 tons 14 cwt., is mounted on two six-wheel bogies, each axle of which is motor-driven. Brake cylinders using compressed air are fitted for the direct actuation of 24 cast-iron brake blocks, one applied to each side of the wheels; each cylinder has automatic means of taking up brake block wear. The locomotive is without regenerative or rheostatic braking.

The locomotive has been designed to operate passenger trains running at 60-75 m.p.h., and freight trains at 40 m.p.h., with a one-man crew; it has the deadman's handle safety precautions. A high braking force of approximately 85 per cent. at 60 lb. per sq. in. air pressure is allowed, to counteract the stored kinetic energy of the armatures, which act as flywheels.

Brake tests were made with the followings trains:—

A. 80-wagon empty freight trains, unbraked and loose-coupled.

B. 1,000-ton (about 75 wagons) loaded freight train, unbraked and loose-coupled.

C. 80-wagon empty freight train, with up to 15 wagons at the head of the train vacuum-braked and close-coupled; balance of train unbraked and loose-coupled.

D. 1,000-ton (about 75 wagons) loaded freight train, with up to 15 wagons at the head of the train, vacuum-braked and close-coupled; balance of train unbraked and loose-coupled.

E. 16-coach passenger train, vacuum-braked and close-coupled throughout.

F. 40-vehicle fast freight train, vacuum-braked and close-coupled.

The locomotive is equipped with:—

1. Straight air brake, that is, a compressed-air system which permits air control to actuate the locomotive brake cylinders up to a maximum of 60 lb. per sq. in. This is the service brake when hauling unbraked freight trains, when running light, and for shunting operations.

2. Automatic air brake, that is, a compressed-air system which actuates the brake cylinders, on the release of compressed air, at the maximum pressure of 60 lb. per sq. in. This is the locomotive brake which is held in reserve for application by the deadman's handle, or by the driver, should he find his straight air brake non-effective. The locomotive, although fitted with an automatic air brake for use in emergency, cannot be used to haul electric trains fitted with the usual Westinghouse automatic brake system. These trains can be worked only as freight trains.

3. Automatic vacuum brake and combined straight-air brake, that is, a system which enables the vacuum brake to be applied on the train and the straight air brake on the locomotive. This brake is used for controlling the locomotive and train brakes when hauling a fully or partially vacuum-braked train.

Compressed air is supplied by two motor-driven horizontal compressors, each with a piston displacement of 25 cu. ft. per min., which charge three main reservoirs having a combined capacity of 15 cu. ft. A reservoir pressure of 90-105 lb. per sq. in. is maintained. Air pipes lead from the reservoirs to two self-lapping driver's brake valves by which any desired pressure up to 60 lb. per sq. in. is obtained. The air passes into the straight air brake, then through a double check valve to the bogies by way of the flexible hose-pipe connections. On each bogie is an automatic valve through which the air passes on its way to the twelve brake cylinders carried thereon.

The automatic air-brake system is connected to the main reservoir by a branch pipe, which conveys air to a suitable brake operating reservoir of 5 cu. ft. capacity. The pressure (80 lb. per sq. in.) is determined by the setting of a reducing valve. Air from this reservoir is normally fed and maintained at that pressure by the driver's valve. This air then flows to the automatic valves on each bogie, which keep the automatic reservoirs and inshot bulb charged.

On the pressure in the automatic pipe being suddenly reduced, the automatic valves operate and connect the brake cylinders with the inshot bulb and automatic reservoir to produce a predetermined timed brake application. An automatic governor is connected to the automatic brake pipe and controls the current supply to the motor controls, so that the locomotive cannot be moved unless the brake pipe is charged; in addition the controls are cut on the application of the automatic air-brake.

From the reservoir, the air supply also goes to the pilot valve in the master electric controller, thence *via* the foot valve to the emergency application valve. When either the pilot valve or foot valve is depressed, deadman's brake applications cannot take place; but should either valve (normally depressed) be released suddenly—that is, deadman's action—the automatic brake will come into operation. A ruptured hose will produce a similar result.

For working vacuum-fitted stock, two electrically-driven exhausters are provided, with aspiring rates of 90 cu. ft., each at 1,040 and 2,000 r.p.m. respectively. The running exhauster is used for maintaining the train vacuum at 21 in. of mercury, and the other, called the releasing exhauster, is operated to accelerate the releasing time after brake applications have been made; the latter is controlled by contacts in the vacuum-brake driver's valve. It was found necessary, in passenger train tests, to extend the original aspiring time.

The instruments, in the locomotive cab, used for the trials included:—

(I) An Everett Edgcumbe speedometer.

(ii) A Richard trainagraph (compressed air) for taking curves of deadman's brake application and also for records of air service brake pressure "build-up" curves.

(iii) A Richard trainagraph (vacuum) for taking curves of deadman's brake applications and also for checking, on the locomotive, the synchronous action of the vacuum brake and compressed-air brake.

(iv) A Wimperis recording accelerometer, to measure normal retardation, and also reactions between the locomotive and the train. Records with this instrument were not taken at the rear end of the train, as in the loose-coupled freight trains the reactions experienced exceeded the scale of the instrument (6 ft. per sec. per sec.). As the Wimperis accelerometer was unsuitable for use in goods brake vans, recourse was made to a device called:—

(v) The tumbler shock instrument, consisting of fifteen thin rectangular pieces of steel placed vertically on edge and pivoted at one corner. They are graduated in height so that different degrees of shock are required to tip them over. The number of pieces knocked over during a shock simply gives a *relative* indication of the degree of shock; the instrument is influenced by upward jerks as well as bunching shocks.

The running and stationary brake tests were then carried out. The results were made available by the trainagraph curves; certain modifications were made to the automatic valve (to give a quick build-up of pressure in the inshot bulb), and to the proportional valve, to give more sensitive control and closer synchronism between air and vacuum brakes.

The tests showed, among other things, the need for extending the aspiring time of the vacuum exhauster. The exhauster as supplied was very efficient, and reduced the time normally needed to release the brake after application; but in tests on stationary trains with this exhauster working only, there was little indication on the vacuum gauge of a brake-pipe reduction during a passenger alarm application, a lowering of the vacuum by only 1 or 2 inches being observed, as against 6-7 inches with a steam locomotive. Having in mind that passenger coach communication apparatus is standardised throughout the country, it was decided to bring the performance of the running exhauster more in accord with steam-locomotive ejectors.

The freight train trials included observations recorded on the 25-ton brake vans, fitted with hand brakes which, however, were not applied during the trials, in order to obtain uniform and comparable results. The vans formed an excellent means of recording locomotive braking performance. The approaching crescendo of sound from the impacting buffers ahead of an uncontrolled van gives one a feeling of apprehension until one has become familiar with the personal probabilities likely to result. As a measure of shock intensity, the tumbler instrument is most useful, obviating such vague descriptions as "heavy," "medium," and "light" shocks. A shock throwing over 15 tumblers will cause damage to rolling stock if continued, and injury to staff if taken unawares; but a shock not sufficient to throw over two tumblers is almost ideal, although on such occasions some shock may be felt on the locomotive. For practical purposes, shocks throwing over more than nine tumblers are undesirable.

No tumblers were thrown over until the buffer heads contacted the buffer guides, indicating that the conveying of goods in partially braked and very long unbraked trains would be better performed by increasing the strength and stroke of the buffer springs. The present design of R.C.H. wagon does not lend itself to this. The last vehicles of a train, unless restrained by skilful use of the hand brake, close up at a fairly high speed and experience the maximum shocks. In the earlier tests sharp snatches occurred on

* Paper presented at the meeting of the Institution of Locomotive Engineers in London on May 31, 1944

the van couplings when starting long trains. This undesirable feature was completely eliminated by seeing that the motorman applied sufficient current to keep the locomotive moving at the uniformly slow starting speed for about three rail lengths (about 50 yards), to enable all the couplings to extend gradually throughout the train.

Points from the Discussion

Mr. L. J. Le Clair, in the ensuing discussion, said he thought that the paper might be of value to those called on to provide brakes on electric locomotives at home and abroad. The tabulated results of braking tests, however, should be given preferably in feet, not yards, so as to make comparison easier with the distances given in the graphs.

Mr. W. D. Rawlings remarked that the authors, in referring to the coefficient of friction, stated that "Tests previously made have revealed that at 10 m.p.h. the coefficient of friction is 75 per cent. greater than at 40 m.p.h." It would be interesting to have some details of the tests in question. On the electrification of the Ghats section of the G.I.P.R. it was essential for the locomotive brakes (synchronising with the vacuum brakes on the train) to be as powerful as possible, as the ruling gradient in that section of about a dozen miles was 1 in 37. The air-vacuum proportional valves for that service were provided with a 10 per cent. adjustment, which was found very useful. One of the concluding sections of the present paper made out an excellent case for the universal braking of wagon stock which, if it were in existence at the present time, would have done much to assist the war effort.

Mr. W. J. A. Sykes referred to the training of motormen in starting very long and heavy trains. Excellent results had been obtained with the training given so far; he cited the case of a guard complaining to the motorman of a bump at a certain junction, indicating that such occurrences were outside ordinary experience.

Mr. K. T. Glascodine said he thought that the usefulness of the tumbler shock instrument would be even greater if it were possible to record the speed with which one of its pieces was tipped over. He had been trying to find what rate of deceleration gave rise to injuries to rolling stock. The graphs in the paper were drawn to a scale of 1 cm. = 5 seconds; but he was more interested in stops taking about $\frac{1}{10}$ second. It was interesting to learn that more damage was likely to occur in the stopping of slow than of fast trains. When drawbars were broken it was usually at speeds below 1 m.p.h., and not when speed was first being reduced from a high figure.

Mr. W. S. Graff-Baker said that although it would perhaps have simplified the equipment if the locomotive had been fitted with the vacuum brake, he understood that such a course would have interfered considerably with the design of locomotive. The combination actually adopted was indeed a triumph—combining air brake and vacuum brake, with the possibilities of braking both passenger stock and also fitted, unfitted, and partially fitted wagon stock. He had always held that if a thing was complicated in proportion to its function it was wrong; but here the function was complicated, too. He asked how much trouble the equipment gave under normal service conditions and whether it required a high degree of maintenance.

Mr. E. S. Cox observed that an attempt had been made in the case of the locomotive to exceed what had been attempted in steam practice, and to produce a locomotive capable of performing every possible function; likewise the braking equipment had to suit all circumstances. He asked what feature in the latter made it impossible to work the locomotive brakes in conjunction with the ordinary Westinghouse-braked electric stock. As to the gradual starting of long, heavy freight trains, the L.M.S.R. Garratt locomotives hauled trains of about 1,300 tons between Toton and Brent. The trains were so long that the portion of line they covered often included several gradients. In starting, the engine was put into mid-gear and the regulator fully opened, and then the valve gear was gradually "wound down," so that the train could be picked up wagon by wagon until all couplings were taut.

Mr. C. C. H. Barton said that it had happened in India that when an electric locomotive was backing on to a train, the driver would remain in the cab at the end remote from the train, whilst a guard or assistant driver or shunter would be in the other cab, at the end facing the train. Instances had occurred in which the driver had applied the vacuum brake (being accustomed to using it when driving) and the other man the straight air brake. In such cases, the double check valve sometimes hesitated, and some collisions had occurred, so that a rule had been written to regulate this procedure. He would be interested to know if anything of the kind had occurred with the Southern Railway locomotive. He also asked how the releasing exhauster was modified to allow a bigger indication to appear on the vacuum gauge during passenger communication applications. Trouble had occurred in India in that way; on one occasion a locomotive and the first two coaches ran about four miles, with rather disastrous results; and it was afterwards decided to recalibrate all the orifices in the brake pipes, to give a suitable reduction.

Mr. E. Humphries said that the authors had made the best of a very bad job, the bad job being not the locomotive but the brakes on the vehicles which it had to haul. With a 12-car train using compressed-air brakes the driver could approach a station at a fairly high speed and, if likely to stop short of his mark, he could release the brakes and reapply them so as to stop dead on the mark. With the locomotive described in the paper and vacuum-braked stock, however, a similar series of events had resulted in the train breaking in two, as the brakes on the locomotive released quicker than those on the train. An electric train could stop easily in 15 seconds, and stops could even be made in 10 seconds. On the trial trains hauled by the electric locomotive it took 45-60 seconds to release the brakes. Although that might not matter much at big stations where long stops were made, it was a most important point where signal checks and certain other factors might apply.

Mr. T. Henry Turner asked for the composition of the brake blocks and the tyres, and of the rails over which the trials were run. There were a good many sorbitic rails in use on the Southern Railway. The hardness values, too, should be added for record purposes. He was very interested in the tumbler shock instrument; if it was new, perhaps the authors would say who invented it. The noise incidental to the braking of loose-coupled freight trains was anything but a good advertisement for the railways; and perhaps one day a Noise Abatement Society would force the abolition of the three-link coupling, even if nothing else could do it. Many fractured parts with which he had been concerned had been caused by rough shunts or abnormally hurried stoppages at signals. He hoped that the authors having developed the locomotive brakes would now deal with the rest of the train.

Mr. C. C. Marsh referred to a graph in the paper showing a full application of the vacuum brake in about two seconds. If it was a 14-coach train, without quick-service valves giving direct admission from the atmosphere, that seemed to be an excellent result. Regarding the passenger communication apparatus, he thought that the valve which it opened was $\frac{5}{8}$ in. diameter; and any small ejector or exhauster would certainly show some effect against a leak through a $\frac{5}{8}$ in. opening. It seemed that there must have been some restriction in the pipes between the passenger communication valve and the vacuum-brake pipe which prevented the full effect of the $\frac{5}{8}$ in. diameter opening from being felt. The piping from the passenger communication valve to the train pipe should be as straight as possible. The tumbler shock instrument resembled a device used in certain South American trials in 1938, where shocks were measured by the number of balls that dropped out of holes of various depths, drilled in a rack.

Mr. A. B. Washington said that the data given in the paper were of especial interest to him, as they enabled a comparison to be made with the L.N.E.R. mixed-traffic electric locomotive intended for the Sheffield and Manchester line. The present authors referred to the necessity for a change-over device to permit the delays and restrictions to be cut out when operating passenger trains, as otherwise the braking force would build up with the same intensity as for a freight train. That the change-over device was necessary he fully agreed, having analysed some of the more limited tests on the L.N.E.R. locomotive, but he would like to know whether the change-over arrangements applied both to the automatic valve and the air-vacuum valve. He himself had attempted to co-ordinate the test results on a common basis of coefficient of friction, a variable which depended on speed, time of braking, temperature, and the materials used for tyres and brake blocks. An estimate of coefficient of friction could be made from Galton's classic work, and then the actual braking force could be estimated, if the air pressure in the cylinders were known. Thence a speed-time diagram could be obtained, which was useful in forecasting what the brakes would do in various circumstances.

Mr. H. Holcroft said that the compressed-air brake was adopted for the locomotive simply because of lack of space to accommodate the equivalent vacuum apparatus. He asked the author what would happen in the event of a burst flexible hose between the bogie and the body of the locomotive. Regarding passenger communication apparatus on steam trains, the small ejector was adjusted during running so as just to overcome all the leaks on the train, so a driver could usually tell if the emergency alarm were given. With a crosshead-driven pump, however, he had known a train to run a long way before the driver realised that the vacuum was slowly falling. He thought that the vacuum exhausters should be capable of adjustment in similar manner to the small steam ejector.

Mr. P. W. Bollen said that in the early design stages, as it was feared that a

bogie vehicle with small wheels would not give such good braking as a steam locomotive with coupled wheels, a test was made with a 500-ton coal train hauled by an express motor coach. The motor coach was simply for braking tests, the whole train being propelled by a steam locomotive in the rear, which pushed the train to the top of a gradient, so that the braking tests could begin on the ensuing descent. The results showed the early fears to be without foundation. He noticed that in the final braking trials, the second half of the braking period showed a vacuum of about 8-10 inches in the vehicles, and wondered what would be the effect of lowering the vacuum to zero. He believed that in starting main-line goods trains, the regular practice was to open the regulator slightly for a short period, then close it, and open it again, repeating the process about three times until the train was fully extended before putting on full power.

Mr. T. J. Aldridge said that one of the most interesting points concerned the arrangements made for braking long freight trains. It was exceedingly difficult to get a good stop, whether the locomotive was steam or electric, and called for great skill by driver and guard on unbraked trains. The authors had shown that the deadman's application gave very smooth stops on long partially braked or unbraked freight trains. That was most important. As the stops thus obtained were so good, was it preferable for the driver to make all necessary stops by deadman's application in order to avoid bad shocks?

Mr. O. V. S. Bulleid (President), in closing the discussion, said that the paper was a good example of a user knowing exactly what he wanted and bringing in an expert (the brake company) to provide it. He wished that the paper would give such concrete data as, *e.g.*, a statement that a train of certain weight travelling at given speed would stop in so many feet without shock. Such information would be useful, for example, in deciding where signals should be placed on a bank of, say, 1 in 100, for trains of a given number of wagons. He himself had been formerly with the Westinghouse Brake & Signal Co. Ltd., and it was indeed curious that he should have had to bring in that firm to provide a Westinghouse brake to operate a vacuum-fitted train.

The authors, the brake company, and all concerned were to be congratulated on the very successful outcome of their efforts.

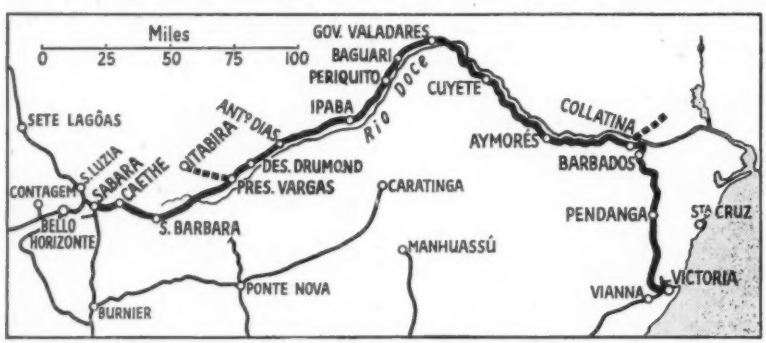
Victoria & Minas Railway Rehabilitation

The war has hastened this work to enable rich iron-ore deposits to be developed for the Allies

ABOUT 400 miles inland up the Rio Doce valley, 225 miles north of Rio de Janeiro, is Itabira, centre of vast hematite iron ore deposits, believed to be some of the richest and largest in the world. There are also extensive mica deposits and rock crystals in this valley, which formerly exported only timber and some gold. A metre-gauge railway connects the Itabira district with the port of Victoria and was worked by British interests, but it has carried only light traffic hitherto, and this has not justified other than barely essential maintenance. To carry a heavy iron-ore traffic the line is being improved, reconditioned, extended, and part of it realigned, as has already been recorded briefly in our columns, notably on January 29, 1943 (page 122), February 5, 1943 (page 150), June 11, 1943 (page 595), and December 3, 1943 (page 557).

For two years the work was in the hands of the Brazilian contractors, but now, to speed it up, two American firms —the Morrison-Knudsen Company and the Raymond Concrete Pile Company— have jointly taken over charge, under the direction of Messrs. Parsons, Brinckerhoff, Hogan & MacDonald, consulting engineers, of New York. As a preliminary to the construction work, attention is being paid to the water supplies, drainage, and sanitation throughout the valley, which is the home of malaria. Port facilities are also being increased greatly at Victoria, where ore-loading equipment is being provided.

The existing railway is open to traffic for 348 miles, and a further 105 miles have been surveyed as extensions. It is single track and laid with 40-lb. and 55-lb. rails. The bridges are designed for 12-ton axle load locomotives, but the gradients and curves are very severe, especially in the first 100 switchback miles out of Victoria. As a result, some 100 miles of line in all are to be realigned, and the ruling grade will be 2·30 per cent. (1 in 43½) compensated for curvature, and all curves sharper than 2 deg. (say 44 ch.) will have transitioned approaches; previously, there was no compensation or transitioning.



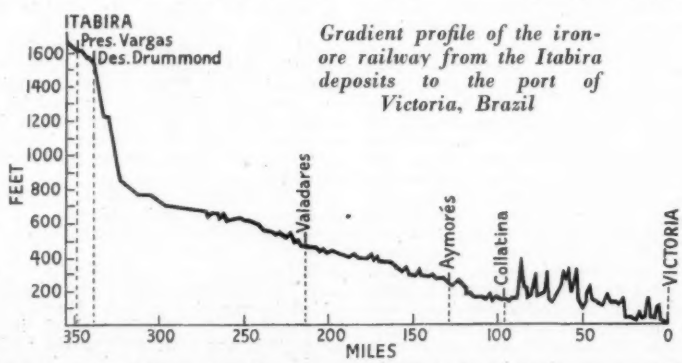
Sketch map of the Victoria & Minas Railway, which is undergoing extensive rehabilitation to meet wartime needs

The rehabilitated track will consist of 70-lb. rails laid on 2,880 sleepers to the mile. Formation in cuttings will be 14 ft. 6 in. where manual labour is employed, but where excavators are used it will be 20 ft. The side slopes will vary from 1½ to 1 in earth to vertical in rock. The maximum depth of cutting is 66 ft., and embankments will have a top width of 13 ft. The earthwork required averages about 63,000 cu. yd. per mile.

Simple crossing stations are being provided at 10-mile intervals, but there is no signalling.

The bridges as renewed will carry E.50 American loading, and the steel spans, varying from 36 ft. to 134 ft. in length, are being supplied from the U.S.A. Eighteen 2-8-2 type locomotives, each having a tractive effort of some 25,000 lb., and 250 55-ton hopper wagons have also been ordered.

At Victoria the ore hoppers will be run over a high reinforced-concrete viaduct to discharge into r.c. storage bunkers, from which loading into holds will be by three conveyors each with a capacity of 500 tons an hour. The storage bunkers have a capacity of 47,000 tons. The ore equipment includes crushing mills near the foot of the 4,500-ft. mountain of iron ore, a 7,000-ft. conveyor from the workings to the railway, and an extension of the line to the mills, according to our American contemporary *Engineering News-Record*, to which we are indebted for many of the above details, as also for the sketch upon which we have based our gradient profile.



Gradient profile of the iron-ore railway from the Itabira deposits to the port of Victoria, Brazil

Track Tests on the Illinois Central RR.

A brief description of the various tests being carried out on a 20-mile experimental section of road

RECENTLY, when relaying with 131-lb. rails, a number of interesting tests were initiated in the central road of a 20-mile triple-track section of the Illinois Central System near Chicago. The two outer tracks carry up and down traffic respectively, but the middle or test track is used by traffic in both directions, amounting to over 20,000,000 gross ton-miles a year. All the rails used were control-cooled and end-hardened, and 36-in. six-bolt head-free fishplates are fitted throughout except at level crossings and alongside platforms, where from two to ten rail lengths have butt-welded joints. The fish-bolts are $1\frac{1}{16}$-in. × 6-in., and tension tests were carried on those in 50 joints at the middle of the section.

The mill scale was thoroughly cleaned from both the fishplates and rail ends of the first 25 joints with an acetylene torch and steel-wire brush. The bolts are of standard type as used throughout the test length, but were specially fitted with strain-gauge holes in each end for taking the bolt tension readings. The next 25 joints were as they came from the manufacturers. Representatives of the Association of American Railroads conducted tension measurements on the bolts in these two 25 rail lengths at the end of July and again early in November, 1943, during which period no bolts were tightened. The purpose of these tests was to determine whether the removal of the mill scale from the rail ends and fishing surfaces of the plates would reduce the initial rate of bolt tension loss or have beneficial effects on fishplate wear.

The insulated joints tested are of the armoured type, and throughout the northern 15 miles spring washers are fitted, and in the southern five miles of the test length Triflex springs are used on all fish-bolts. R.M.C. plastic joint lubricant, Crator compound, graphite grease, and ordinary oil are used in different sections between the rails and fishplates for purposes of comparison.

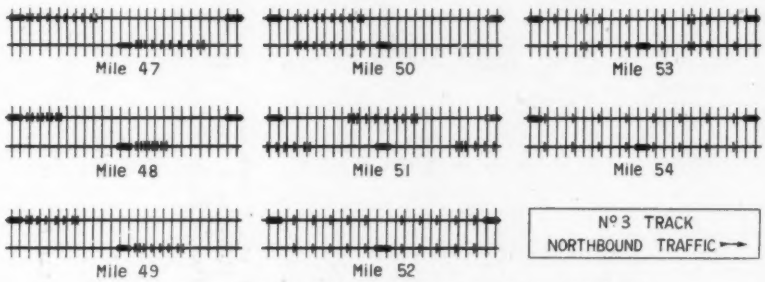
Due to experience having shown that rail bearing plates tend to cut into soft-wood sleepers, particularly at the inner plate edges between the rails, and so cause an $\frac{1}{8}$-in. tightening of gauge, tests were also carried out with various types of bearing plate, namely $7\frac{1}{2}$-in. x $14\frac{3}{4}$-in. with $\frac{1}{2}$-in. eccentricity and weighing 22 lb., $7\frac{3}{4}$-in. x 13-in. with $\frac{9}{32}$-in. eccentricity and a weight of 19 lb., and 8-in. x 12-in. with $\frac{17}{32}$-in. eccentricity and weighing $16\frac{1}{2}$ lb. All types have flat bottoms and a cant of 1 in 40.

The secure fixing of bearing plates to sleepers is also to be the subject of tests with different kinds of fastenings, such as four screw spikes, two screw spikes, and four and two dog-spikes per bearing plate, and no fastenings at all between plate and sleeper. In each case, however, the rails will be secured to the sleepers independent of the bearing plates by $\frac{5}{8}$-in x $\frac{5}{8}$-in. x 6-in. dog-spikes; the screw spikes are $\frac{7}{8}$-in. x 6-in., and half of them will be fitted with double-coil spring washers.

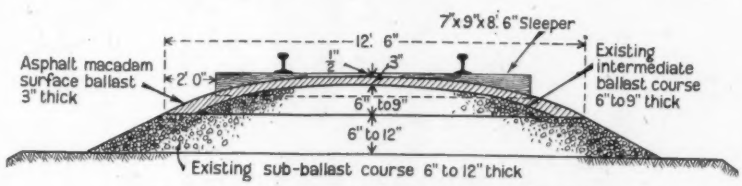
To prevent creep, 14 rail anchors of different types were fitted per rail length, and in addition 12 rail clips to the rail length were used. Eight different arrangements of the anchors were installed, as shown by the accompanying diagram.

The following kinds of sleepers and ballast are also on test in the centre road: Three miles of 7-in. x 9-in. x 8 ft. 6 in. creosoted sleepers out-of-face, one mile being laid with each of the following timbers, pine, gum, and oak. The northern ten miles of the test section have an average of 6 in. of slag ballast under the sleepers, and the next nine miles 6 in. of crushed stone. The remaining mile has the same depth of chats. Boxing is completed to two standard sections, the full section having ballast beyond the sleeper ends to within 2 in. of their top surfaces, and a light section with no ballast above sleeper bottoms outside the sleeper ends.

Half a mile of track has a self-draining, non-fouling asphalt macadam ballast surface, as shown in the second accompanying diagram, an entirely new and experimental measure. The stone ballast was sprayed with hot asphalt to the extent of 2 to 3 gal. per sq. yd. The ballast was dry and the asphalt penetrated to a depth of about 3 in. Immediately following the asphalting, stone screenings, passing through a $\frac{1}{4}$-in., but retained on a No. 4 mesh screen, were spread lightly over the asphalt and tamped into the interstices with iron asphalt tampers. A second sealing coat of hot asphalt was then applied and covered with a thin layer of fine stone aggregate, just under $\frac{1}{2}$ gal. of asphalt per sq. yd. being used. The aggregate was brushed over to secure uniform distribution.

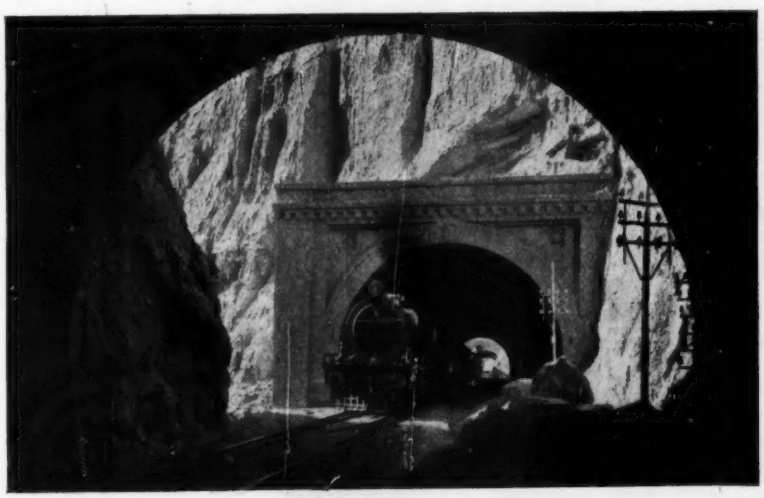


Various arrangements of rail anchors tested on track No. 3



Cross section of asphalted ballast under test

These tests are being carried out under the supervision of Mr. C. H. Mottier, Chief Engineer, I.C.RR. Interested in the majority of the tests is Mr. G. M. Mayce, Research Engineer, A.A.R., who is co-operating with Mr. Mottier, according to our American contemporary, *Railway Engineering & Maintenance*.



Down fruit train on the N.W.R. (India) between Quetta and Sibi, leaving one tunnel and about to enter another on the single-line section. The engine is a standard superheated "HG" class 2-8-0. The tunnels are constructed to allow for future doubling of the track

General view of one of the 2-8-2 locomotives for the Indian State Railways, orders for 75 and 70 of which were placed recently with the Canadian Locomotive Co. Ltd. and the Montreal Locomotive Workes Limited, respectively (see our issue of February 4 last). A number has already been shipped to India. The contracts are to the inspection of the Canadian Pacific Railway

Diagram showing the principal dimensions and weights of the locomotive, and the tender capacities

CANADIAN-BUILT LOCOMOTIVE FOR INDIAN STATE RAILWAYS

Train Telephone Communication on the Pennsylvania RR.

The great length of many freight trains and the operating conditions obtaining in America make train communication especially advantageous in that country

THE modern developments in electronics and equipment made for various purposes, designed to apply electronic theory, have opened the way to the successful application of an idea which is itself relatively old, namely, establishing communication between guard and engineman, especially in long freight trains and between moving trains themselves or moving trains and stations. Wireless equipment frequently has been proposed for these purposes, but it is already serving a great many others, and this fact makes it practically impossible to obtain the use of suitable wave bands for train communication service. The great length of the freight trains run in America and the operating conditions there have rendered it more than ordinarily desirable to establish some system of train communication. Speech between driver and guard is very useful when making decisions as to running under train orders and so on, and communication with a station or, more important still, a dispatcher's office, would form a valuable adjunct to the existing facilities and often avoid unnecessary stops—in some circumstances, even accidents.

Equipment on Pennsylvania Railroad

The Pennsylvania Railroad has applied on part of its branch, running from Trenton to Stroudsburg and known as the Belvidere branch, a system of train communication developed by the Union Switch Signal Company of Swissvale, in conjunction with several railways. It extends at present from Trenton to Phillipsburg and combines certain features of both wireless and wire telephony; the transmission paths are restricted to railway property. In September, 1941, it was decided to conduct experiments and in 1942 a locomotive and car had been equipped and placed in service with the necessary lineside apparatus. Nine more locomotives and cars were later fitted and there will shortly be two block stations, or signal boxes, in service instead of one.

A recent article in the *Railway Age* by Mr. W. R. Triem, General Superintendent of Telegraph, P.RR., describes the apparatus as using the upper side band of a 5,700-cycle carrier for transmitting calling signals and voice. The carrier current is fed conductively into the rails, picked up inductively from them and induced in the communication wires along the line. It is carried through the rails and line wires between front and rear of a train, between one train and another and to stations by direct wire connections in the vicinity. At the sending telephone on the locomotive and car a circuit is provided by a loop from an insulated bogie to an adjacent one over the rails, and a current at carrier frequency is sent out along the rails and adjacent line wires; the return path is through the earth. The impedance drop in the rails between the two bogies gives rise to the transmission rail voltage. Receivers pick up the energy, which is transmitted through induction coils in proximity to the rails and amplified and demodulated for reception in the loud speakers and hand telephones.

At the station the transmitting connections, when talking or signalling, are made to a simplex leg of a block line and to the rail system; the circuit is completed by capacity coupling between the block line and the rails for the length of the branch. Receiving connections are made to the rails about 150 ft. apart, the impedance drop between providing the energy, which is amplified and demodulated for reception.

Train Equipment

Weatherproof equipment is used on the locomotives and cars. The container on the locomotive is placed near the front end, with receiver coils about 4 in. above rail level, between the bogie or pony truck and the driving wheels. The loudspeaker is in the cab roof; the controlling box with calling button, indication lamps, volume control and telephone hand combination are above and in front of the driver. In the car the equipment box and storage battery are under one of the seats; the output transformer is midway between the bogies below the vehicle. The receiving coils are again about 4 in. above rail level. The loudspeaker is in the lookout roof and the other apparatus on a partition. The apparatus details are of commercial design.

At the block station, besides the main apparatus, there are a desk stand microphone, call button, lamp indicator, head telephone receiver and foot switch. With the head set in use the loudspeaker is cut out. Maximum power needed is about 550 watts for signalling and talking and 150 watts for receiving, provided on the locomotive by the headlight generator, in the car by storage batteries, and at the block station from the outside supply.

For the best working it was found desirable to have one rail bonded through and instal resistance shunts at insulated joints. The car bogies—the cars were cabin or guard's cars—were insulated by $\frac{1}{8}$-in. hard fibre plate insertions to prevent current passing from the car frame to the insulated bogie. Insulating on the engine proved less easy, the front pony truck of the type of locomotive used on the Belvidere branch being the one most easily dealt with.

Operation of the System

Between Trenton and Phillipsburg the train equipment is kept continuously switched on, and when entering the section covered enginemen make a test by talking to their guard and the operator at Frenchtown. To telephone out a call signal is sent which is heard in loudspeakers at the stations and on trains within reach. The station name or engine number is then broadcast until communication is established and a reply received. The conversation is simultaneously transmitted through other units within radius, any one of which can break in, if need be. The range of communication has been kept relatively short. Good transmission is provided up to 4 miles. To go beyond that would not, in this case, it is thought, serve either safety or operating efficiency. Communications can be relayed through the Frenchtown operator.

Experience has shown that the equipment has definite advantages. The operator can find out from trainmen just what their movements are and keep the dispatcher advised, facilitating his work. Anything unusual occurring is soon known and reported; immediate action can then be taken. The communication between guard and enginemen is found to improve operation and reduce delays. Starting, stopping, shunting, setting off and taking on wagons, testing brakes, handling defective vehicles, etc., are the subject of constant conversations.

Automatic signals were not justified on the Belvidere branch as there was not sufficient traffic density to call for them, and the ordinary Pennsylvania manual block regulations, which are stricter than those in use by many other lines, are still in force. When trains take a siding loop the clearance of the main line is promptly reported direct and movements are now made almost as readily and conveniently as if automatic signals were in use. Permissive block is allowed for two following freight trains, and after a train has entered a section under a permissive signal the one ahead may of course soon leave it, so that running at caution is no longer called for. With the new equipment a message can be sent direct to the trainmen giving them authority to run at authorised speed and time is saved.

The New Line of the Madrid "Metro"

THE Underground railway system of Madrid, which has many points of resemblance to that of Paris and has proved as popular and useful, has been enlarged this year by the construction of a line 3½ km. (2½ miles) long, which has eight stations—four of them interchange points—and, under the name of the "boulevard route," connects the Argüelles and Goya Stations, passing *via* the San Bernardo, Bilbao, Alonso Martinez, Colón, and Velasquez Stations.

The new line, which was opened officially on March 23, is constructed as a double-line tunnel, except under the Plaza de Colón, where two single-line tunnels had to be provided. It is operated on the d.c. system; current is taken from an overhead conductor. Track-circuit automatic signalling is installed. The total cost was about 50 million pesetas, or five times that of the first route, opened in 1919. The length of the system is now about 26 km. (16 miles).

The stations on the new route are constructed in the customary style, although with wider platforms in certain cases, and short staircases to street-level. The platforms can accommodate four-coach trains. Repair and inspection sidings are provided at Argüelles Station and sidings are provided elsewhere as required; there is a single-line connection with the rest of the system at the Goya terminus, leading to route 2. The interchange subways have been made large and arranged to provide for the maximum flow of passengers. A liberal display of indicating signs makes it easy to find the correct platform. The lighting is excellent and the stations have a cheerful appearance.

The line does not touch the centre of the city, but provides a previously much-needed connection which tends to relieve congestion there. Last year some 12 million passenger-km. (about 7,500,000 passenger-miles) were run on the Madrid Metropolitan Railway, a record figure.

XUM

Thermobloc Recuperator and Heat Exchanger

A metallic unit of small bulk and low first cost

MUCH of the total heat in fuel fired furnaces is lost in the waste gases and waste heat recovery has been standard practice for many years; the majority of large industrial furnace installations are either on the regenerative principle or alternatively on the recuperative principle.

The reversing regenerative principle is successfully applied to large high-temperature furnaces, either for the melting of metals or for high-temperature pre-heating for forging, whereas in heat-treatment plant the recuperative principle is often adopted because it is easier to obtain precise temperature control by this means than with the regenerative furnaces wherein the source of heat is applied first to one side and then to the other.

In recent years the development of alloy steels capable of withstanding relatively high temperatures has facilitated the use of metallic recuperators and heat exchangers in place of brickwork recuperators. Metallic recuperators have proved highly satisfactory because of accessibility, low thermal capacity, and gas-tight characteristics. Their use, however, has been limited due to high cost when manufactured in special alloys such as nichrome, and it has been desirable to develop an efficient type of metallic recuperator, of small bulk and low first cost, with widest application to industrial heating problems. The Patent Incandescent Thermobloc manufactured by the Incandescent Heat Co. Ltd., Birmingham, covers these requirements:—

(1) The unit is such that it can deal with waste gases at temperatures in excess of 1,000° C. without the use of expensive heat resisting alloys in its construction.

(2) The rate of heat exchange per sq. ft. of surface area is so high that the body of the Thermobloc can be kept without "colour" even when the waste gases are over 1,000° C.

(3) With overall dimensions 9 3/16 in. × 9 in. × 11 7/8 in., the heat exchanging surface is 5 sq. ft. for No. 1 Thermobloc; and with dimensions of 9 3/16 in. × 12 3/16 in. × 15 in., the heat exchanging surface is 10 sq. ft. for the No. 2 Thermobloc.

(4) Mixtures of gas and air can be reheated with complete safety in the unit, which is perfectly gas tight, and the provision of spiral corebusters in the mixture passages ensures an intimate premix of gas and air, resulting in higher combustion efficiency with minimum stratification.

The Thermobloc consists generally of two banks of small diameter tubes contained in a matrix of cast iron, ensuring metal to metal peripheral contact between each tube of either bank. One bank of tubes is disposed vertically and the other is horizontally interlaced between the vertical bank. Usually the vertical bank of tubes is used for the passage of waste gases and the horizontal bank is used for the air, gas or mixture which it is required to pre-heat. The waste gases are thus split into several small streams over a large surface area for the release of sensible heat into the horizontal bank of tubes. Similarly, the medium entering the horizontal bank of tubes is split into a large number of streams, giving a large area for the absorption of heat from the waste gases. The rate of heat absorption is further intensified by the spiral corebusters, which constantly break up the relatively cold core in the centre of each tube and throw it outward towards the periphery by centrifugal action, thus ensuring a high convection scrub to facilitate the absorption of heat.

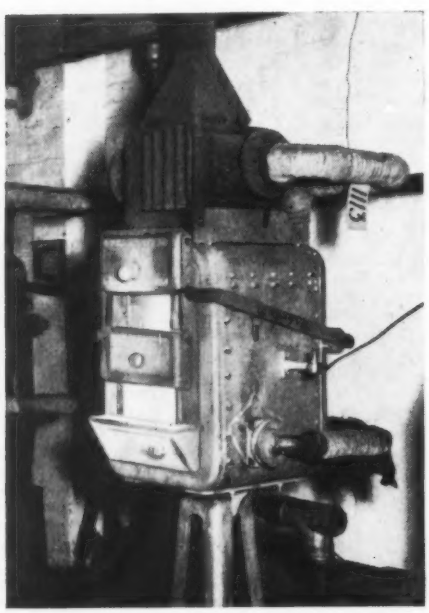
As the rate of heat exchange between two gases travelling through the tubes is a function of the velocity of the gases, and also of the rate of heat transmission between the tube walls, the metal to metal contact of the tube walls ensures the highest rate of heat transfer, and this, coupled with the division of the gases into a large number of relatively fine streams, effects a particularly high rate of heat exchange per unit of heat-exchanging surface. In addition, this arrangement of tubes provides the maximum heat-exchanging surface per unit of volume of the Themobloc.

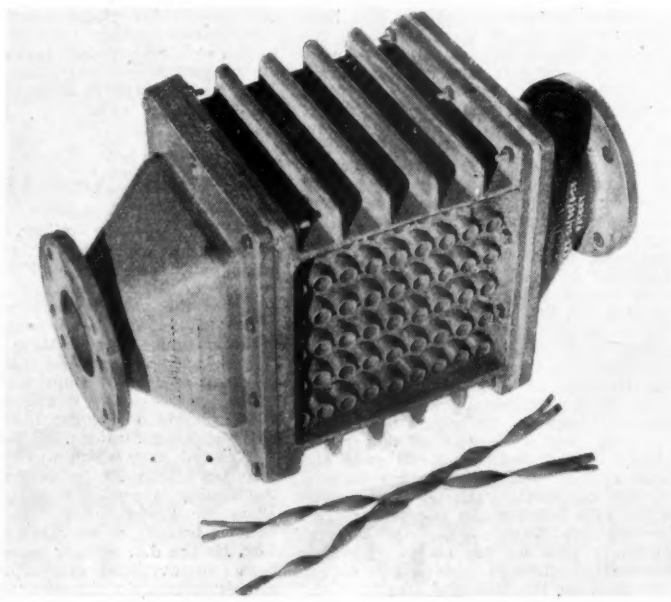
Thermoblocs may be used singly or in banks in series or in parallel, and their use permits an economy of at least 75 per cent. of the space required for a metallic recuperator of given capacity, as compared with heat exchangers of conventional design.

A typical H.S.S. tool hardening furnace heated by clean producer gas is illustrated, in which temperatures up to 1,500° C. can be readily obtained and maintained, thereby permitting the use of the furnace, at somewhat lower temperatures of say, 1,350° C., with the heavily reducing atmosphere necessary for the critical treatment of delicate tools and cutters. A small H.S.S. furnace shows an economy of 25 per cent. in gas consumption when using a Thermobloc for preheating the air, as compared with the operation without preheat.

Thermoblocs may be applied to existing furnace installations with a resultant economy of about 20 per cent., apart from enabling accurate atmosphere control with consequent improvement in the protection of the metal under treatment. Although the patent incandescent Thermobloc was designed primarily for dealing with high temperature problems, the same design has succeeded when used for heat exchangers for lower temperatures.

ONE HUNDRED MILLION BOOKS.—Mr. C. U. Peat, Joint Parliamentary Secretary, Ministry of Supply, has announced that the target of 100,000,000 books and magazines in the National Book Recovery & Salvage Campaign has been reached.





Left: The application of recuperators to a batch of furnaces for hardening high-speed steel
Right: Thermobloc recuperator with corebusters

Station Design — A Modern L.M.S.R. Example

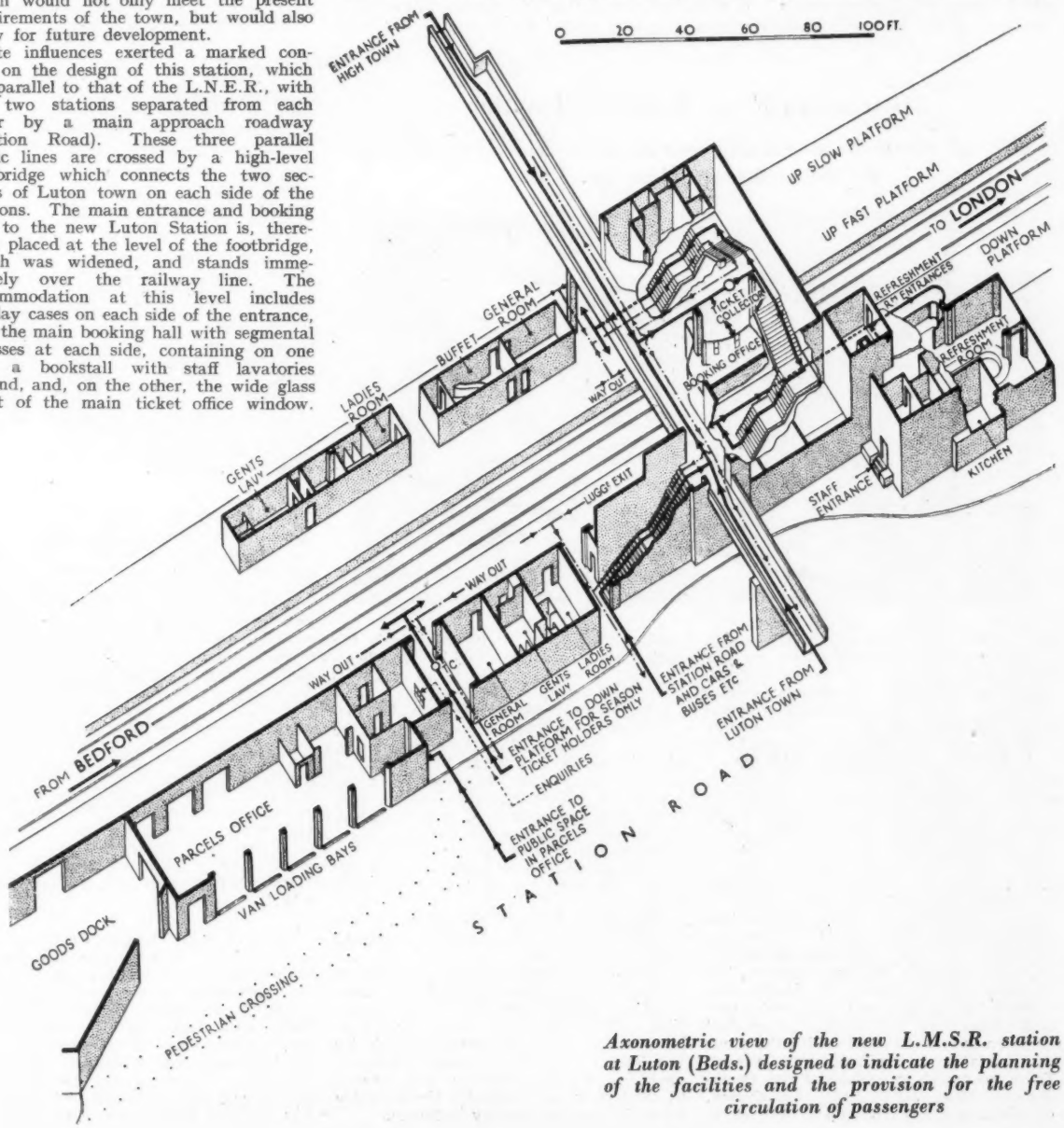
A striking example of modern British practice at the important wayside station of Luton

LUTON Station, on the Midland Section of the L.M.S.R., endeavoured for many years to cope with an ever-increasing parcels and passenger traffic caused by the rapid development of industries in the town and its surrounding district. Luton, which had a pre-war population of approximately 92,000, has been described as the metropolis of the hat-making and allied trades. To these industries can be added bleaching and dyeing, and many branches of the motor-car manufacturing industry. The old stone-built Gothic-revival station at Luton had obviously outlived its period of usefulness, and work was begun in 1938 on the building of a new station which would not only meet the present requirements of the town, but would also allow for future development.

Site influences exerted a marked control on the design of this station, which lies parallel to that of the L.N.E.R., with the two stations separated from each other by a main approach roadway (Station Road). These three parallel traffic lines are crossed by a high-level footbridge which connects the two sections of Luton town on each side of the stations. The main entrance and booking hall to the new Luton Station is, therefore, placed at the level of the footbridge, which was widened, and stands immediately over the railway line. The accommodation at this level includes display cases on each side of the entrance, and the main booking hall with segmental recesses at each side, containing on one side a bookstall with staff lavatories behind, and, on the other, the wide glass front of the main ticket office window. Immediately opposite the entrance is the ticket collector's box controlling the two gateways leading to the staircases which give access to the island platform and the main platform.

The island platform has general and ladies' waiting rooms, lavatories, and a buffet, and is covered with an awning for a considerable portion of its length. The main buildings at low level are arranged along the platform adjacent to the approach road, and form a narrow block giving an external frontage of 327 ft. Within this block of buildings there are three distinct groups of rooms. At one end there is the large parcels office with its clear floor space approximately 80 ft. long by 32 ft. wide, and five cartage bays covered by an awning opening on to the approach road. Next to this is a secondary booking office for low-level access to the station, and the main waiting rooms and lavatories. The third section of accommodation at this level is mainly for staff, and includes telephone testing room, foreman's office, porters' room, lamp room, and heating chamber. There is also a staircase up to the high-level footbridge.

Adjoining this accommodation is an interesting development of the station buffet, which takes the form of a café bar, 55 ft. long by 12 ft. wide, with a screened-off corner for dining accommodation. This café bar is approached from the platform, and its wide windows give excellent lighting, with a good view along the line from the window at the end of the room. It is served by means of a counter which is elliptical in plan, and provides service for a maximum area of room with minimum movement on the



Axonometric view of the new L.M.S.R. station at Luton (Beds.) designed to indicate the planning of the facilities and the provision for the free circulation of passengers

part of the staff. The kitchen and larder are adjacent to this refreshment accommodation, and above this block is a first floor which provides residential accommodation for a manageress and domestic staff.

The buildings adjoining the approach road and the high-level buildings have a reinforced-concrete frame construction with flat concrete roofs. The walls are in cavity brickwork. The main beams carrying the high-level buildings have a clear span of 65 ft. Platform awnings are constructed on steel stanchions and cross beams, and roofed with a wood purlins and boarding covered in bituminous felting.

All external walls are faced with Chesham brown multi-coloured bricks jointed with a lightly rubbed cream pointing. Sills are in moulded brickwork, windows are steel framed, and all parapets are finished with a coping of reconstructed stone. Externally, the building groups naturally about the old footbridge which gives the main access to the station. Points of importance like the entrance and the leading bays are emphasised by the architectural treatment. Where advertising posters are used, an attempt has again been made, as in all this railway company's recent work, to arrange this display so that it forms a part of the architectural scheme.

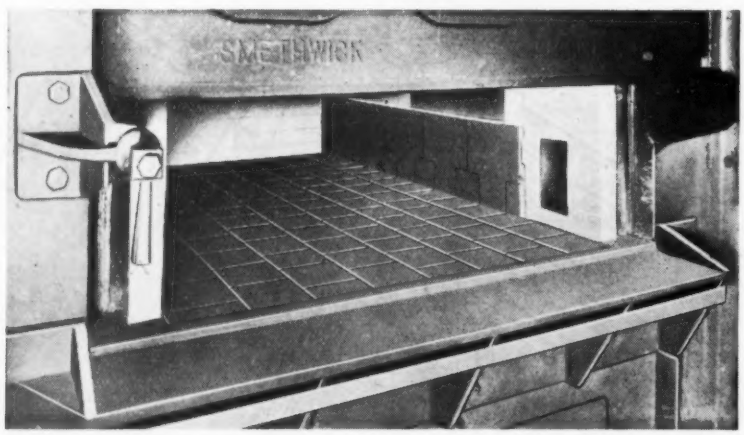
Internally, an attempt has been made to choose finishes which can withstand hard wear and are easily cleanable, but at the same time pleasant in appearance. The finishing to the high-level booking hall is typical. Floors are paved with a light fawn terrazzo slab marked out with carborundum jointing lines. The walls are finished in faience, and all joinery is carried out in Indian silver greywood. Lighting fittings are specially designed, and trough fittings are fixed to the ceiling and made in units to follow the curves of the side walls.

In the refreshment rooms, lighting effects have been combined carefully with the general colour scheme. Walls are panelled to dado height with moulded plyboard in French walnut. This panelling is also used along the counter front. Above the counter the ceiling is dropped about 2 ft. to form a coping with circular bulkhead light fittings in its soffit. Walls above dado height are in pale cream, with a ceiling of broken white. Doors are flush and veneered with cobalt blue Roanoid, and the windows are provided with curtains with a blue ground and dull gold pattern. The floor is covered with blue-grey Korkoid tiles. In waiting rooms, floors are covered with Korkoid tiles, and walls have a Cellulin dado in natural grey. Furniture consists of Finmar chairs of two types, upholstered in blue and ribbed moquette.

The architect for the new Luton Station was Mr. William H. Hamlyn, F.R.I.B.A., and the work was effected under the direction of Mr. W. K. Wallace, Chief Civil Engineer of the L.M.S.R. The assistant architect in charge of the work was Mr. H. Holland, A.R.I.B.A. The structural steelwork and reinforced-concrete work on the site were supervised by the District Engineer, Colonel J. N. Peck, B.A. The general contractor was Holliday & Greenwood Limited.

Distortion-Free Metallic Hearths

Use of small heat-resisting interlocking tiles designed by the Incandescent Heat Co. Ltd.



FURNACE engineers have long sought to evolve a distortionless metallic hearth for heat-treatment, carburising and annealing furnaces. A metallic surface facilitates charging and discharging operations; hearth temperature is quickly recovered after the charging of a cold load; and there is a far greater resistance to abrasion than with a brickwork hearth, thereby reducing maintenance costs.

It has been common practice to fit heat-resisting plates on ordinary brickwork hearths subject to rough and heavy usage, but the general development of this form of protection has been hindered by the relatively high distortion of these plates when they are subjected continually to the loading of cold components. This distortion not only makes it difficult to charge and discharge the furnaces, but the life of the plates is considerably reduced because the protective scale, normally formed on their surfaces, is cracked off when the plate distorts, with the result that oxidation in depth quickly develops. To overcome these difficulties the Incandescent Heat Co., Ltd., Smethwick, Birmingham, has designed the Nicrotectile hearth, by means of which the entire hearth area is covered by small heat-resisting tiles, interlocked in all planes so that they cannot be displaced.

The design of the tiles is such that distortion is avoided, and a hearth can be built up, or dismantled, in a few minutes. If a tile should fail, it can be replaced at negligible cost, whereas the failure of any portion of an ordinary plate hearth may mean the replacement of a large plate. Apart from protecting the hearth, Nicrotectiles also provide protection for the furnace guard-tiles on either side of the hearth, an additional feature of practical value.

The accompanying illustration shows a complete hearth area covered by standard interchangeable elements.

Although primarily designed for hearth protection in furnaces operating at temperatures up to 1,000 deg. C. Nicrotectiles may be used for many other purposes. They are particularly suitable for the construction of waste-gas dampers operating at temperatures up to 1,100 deg. C., and their use eliminates the necessity for water cooling in many instances.

ANGLO-ARGENTINE TRAMWAYS.—A new scheme of arrangement was submitted recently to a meeting of holders of the 4 per cent. income debenture stock (formerly the 5 per cent. debenture stock) of the Anglo-Argentine Tramways Co. Ltd. The purpose of the scheme is (with the previous approval of the City of Buenos Ayres Tramways Co. (1904) Ltd., which has now agreed to a further two years' moratorium in respect of the annuity payable to it) to extend for one year as from January 1, 1944, the periods of release from debenture stock interest and redemption obligations provided for by the scheme of 1940, and to postpone until June 30, 1947, fulfilment in the case of the first and second debenture stocks of the company's interest obligations and sinking fund payments in respect of the first and second debenture stocks and of the income debenture stocks for the years 1945 and 1946.

P.D. 228 & 229 AMENDMENTS TO B.S. 970.—An amendment slip has been issued to British Standard 970, which incorporates modifications to Steels EN 24, EN 23, EN 34 and EN 110. The alteration to EN 24 relates to the deletion of the note permitting the omission of molybdenum and the addition of a footnote to the effect that the relaxation of the Izod test does not apply to material under condition Z. The alteration to EN 33 relates to heat treatment to be given to test pieces; that to EN 34 modifies the chemical composition; and that to EN 110 relates to mechanical properties. In view of the alteration to EN 110, it has been necessary to amend the requirements in the sanctions in B.S. 970B, and this amendment is issued as P.D. 228. Copies of these amendments may be obtained from the British Standards Institution, 28, Victoria Street, S.W.1.

BOLIVAR AND PUERTO CABELLO RAILWAYS.—The scheme submitted by the Bolivar Railway Co. Ltd., providing for the acquisition of the undertaking and assets of the Puerto Cabello & Valencia Railway Co. Ltd. and for other financial arrangements, has been approved at a meeting of holders of Bolivar Railway 6 per cent. debenture stock. Details of the scheme were given on pages 562 and 583 of *The Railway Gazette* for June 2 last.

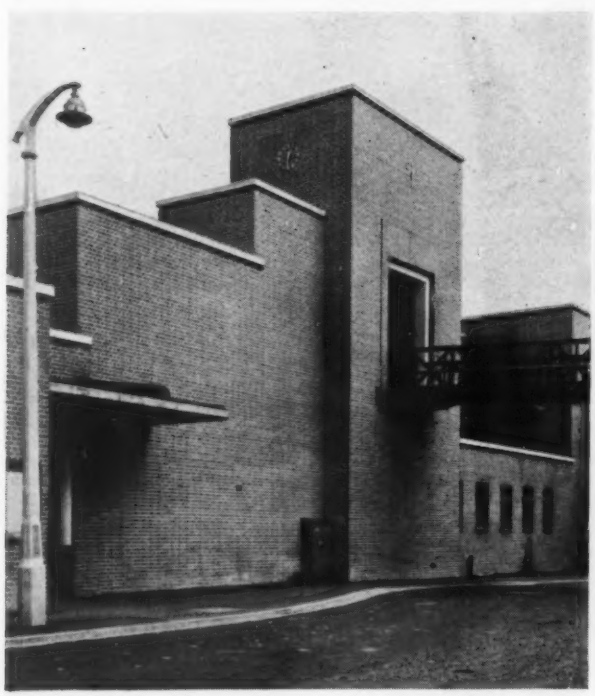
Platform view showing the booking office spanning the tracks. The picture was taken looking northward towards Bedford from the up fast platform; the down platform is to the left, and the up slow platform to the right

Main booking hall, in the block spanning the tracks

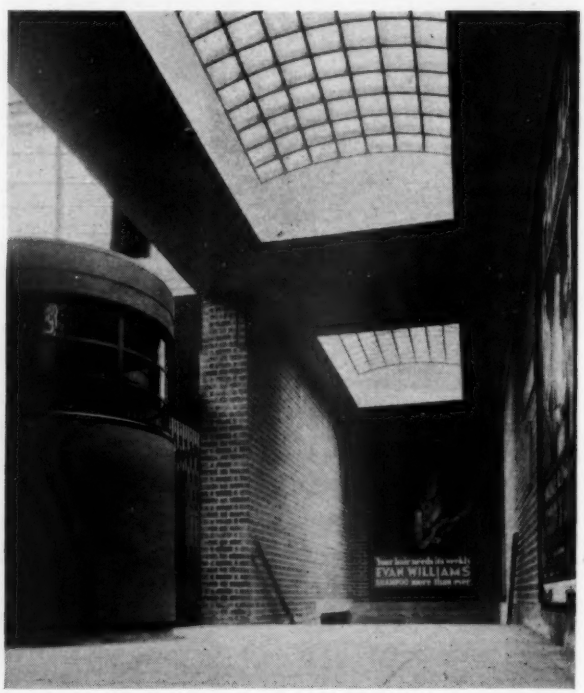
Cafe bar, with elliptical counter

THE L.M.S.R. STATION AT LUTON (See page 15)

Entrance to Luton Station, L.M.S.R., from Station Road



View from Station Road showing the building housing the main staircase approach (with entrance on the left). On the right may be seen the public footbridge which connects the two sections of Luton town on each side of the station



Head of the stairway access to the platforms from the booking office level above the tracks. The ticket collector's office, and the excellent lighting, will be noticed. This view was taken before blackout was provided

THE L.M.S.R. STATION AT LUTON (*See page* 15)

RAILWAY NEWS SECTION

PERSONAL

Mr. A. H. S. Hinchliffe has been appointed a Director of the London & North Eastern Railway Company, to fill the vacancy created by the death of Sir Christopher Needham.

Major Oscar Loewenthal, C.B.E., who, as recorded in our last week's issue, retired on July 1 from the local committees in Argentina and the General Managerships of the Buenos Ayres Great Southern Railway Co. Ltd. and Buenos Ayres Western Railway Limited, and from his other railway activities in Argentina, was born on March 5, 1880, and was educated at Acton Collegiate School, Zürich Technical College and the University of Geneva. Thereafter he held successive appointments as Assistant Engineer with the Tehuantepec Isthmus Railway (Mexico) and National Railways of Mexico; Chief Construction Engineer of the Real del Monte Mining Company (Mexico); and as Construction Engineer with the North Western of Brazil Railway, Leopoldina Railway and Port of Victoria Railway (Brazil). After occupying the position of New Works Engineer, Buenos Ayres Great Southern Railway, he was appointed Chief Engineer & Deputy General Manager, Madeira-Mamoré Railway (Brazil). He then became General Manager, Southern San Paulo Railway, and later General Manager, Argentine and Chilian Transandine Railways. In 1929 he was appointed General Manager of the Entre Rios and Argentine North Eastern Railways, and in 1936 he became Manager of the Buenos Ayres Great Southern and Buenos Ayres Western Railways. He was appointed General Manager of those railways in 1939. At the time of his retirement Major Loewenthal was a member of the British-Argentine Railway Committee; a local representative in Buenos Aires of the Buenos Ayres Midland Railway Co. Ltd.; General Manager, and a member of the local board, of the Bahia Blanca & North Western Railway Co. Ltd.; and Vice-President of the Buenos Aires Central Railway. During the war of 1914-18 Major Loewenthal served in France with the Royal Engineers, and later as officer in charge of the construction of Admiralty National Shipyard No. 1; subsequently he was Technical Adviser to Managing Director, Admiralty National Shipyards. Major Loewenthal was made a Commander of the Order of the British Empire in the King's Birthday Honours List of this year.

Major Oscar Loewenthal

General Manager, Buenos Ayres Great Southern and Western Railways, 1939-44

Mr. H. N. Anderson

Appointed Acting General Manager, Buenos Ayres Great Southern and Western Railways

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South African Railways & Harbours

Mr. J. F. Kuys, Assistant Manager, has been appointed Manager, Publicity & Travel Department, Johannesburg.

Mr. G. S. Leverton, Chief Superintendent (Parliamentary), has been appointed Assistant Airways Manager, South African Airways (operated by the Railways & Harbours Administration).

Mr. H. N. Anderson, Assistant General Manager, Buenos Ayres Great Southern and Buenos Ayres Western Railways, who, as recorded in our last week's issue, has been appointed Acting General Manager of those railways, as from July 1, is also General Manager of the Buenos Ayres Midland Railway, which position he has held since 1936. Mr. Anderson entered the service of the B.A.G.S.R. in 1900 as a junior clerk, and occupied various posts in the management until the outbreak of war in 1914, when he joined the British Army. He served with the Royal Scots in Salonika, and later in Mesopotamia as Personal Assistant to his former chief, Major-General R. de Candolle, Director-General of Transportation, whom he subsequently accompanied to Constantinople. There he served on the Military Control & Operating Staff of the Anatolian Railway in the capacity of Assistant Manager, with the rank of Major, with which subsequently he was commissioned in the Regular Army Reserve of Officers. In 1921 he rejoined the B.A.G.S.R. as Personal Assistant to the General Manager, and in 1928 was promoted to be Assistant to the General Manager. On the appointment in July, 1935, of Mr. C. R. S. Harris as Director-General of the B.A.G.S.R. and B.A.W.R., Mr. Anderson was selected as his Assistant, which position he occupied in conjunction with that of General Manager of the B.A.M.R. from 1936. He was appointed Assistant General Manager of the B.A.G.S.R. and B.A.W.R. in 1939, and

continued as General Manager, B.A.M.R. In connection with the decentralisation of the administrative work of the B.A.G.S.R. and B.A.W.R. in March, 1943, Mr. Anderson was placed in direct charge, under the General Manager, of all the routine work relating to the operation of the two railways.

Mr. Reginald F. Glazebrook has been elected a Director of the Midland Bank Limited and of the Midland Bank Executor & Trustee Co. Ltd.

L.N.E.R. Appointment

The L.N.E.R. announces that Mr. A. A. Snowball, Goods Agent, Leeds (Wellington Street), has been appointed Acting Assistant District Goods & Passenger Manager, Nottingham.

We regret to record the death on June 27, at the age of 68, of the Reverend Frederick Arundel Rogers, sometime Head of the South African Church Railway Mission.

The King has awarded the Imperial Service Medal to six employees of the Transport Department of Tasmania. The Imperial Service Medal has also been awarded to Mr. T. M. Koronga, Locomotive Driver, Tanganyika Railways, and to Mr. John Mills, Chargeman, Grade II, Gold Coast Railway.

G.W.R. Appointments

The Great Western Railway announces the following appointments :—

Mr. C. E. Shaw, Goods Agent, Birmingham, to be District Goods Manager, Newport, on the retirement of Mr. J. M. Wildsmith, from July 1.

Mr. F. A. Masters, Goods Agent, Swansea, to be Goods Agent, Birmingham, from July 1.

Mr. W. Griffiths, Chief Clerk, District Goods Manager's Office, Cardiff, to be Goods Agent, Swansea, from July 1.

Mr. H. H. Starr, Assistant District Goods Manager, Birmingham, to be Goods Agent, Cardiff, from August 1.

We regret to record the death on July 3 of Mr. Leonard Mark Turnham, General Manager of London Coastal Coaches Ltd., most of the capital of which is held by railway-associated provincial bus companies.

Due to the burden placed on the Managing Director of Vokes Limited, Mr. C. G. Vokes, by the rapid growth of the company's production, added to the diversity of its filtration production and the dispersal of its factories, certain changes in organisation have been found necessary. Mr. A. A. Smith, who has been with the company for several years as its Chief Designer, has been appointed Deputy General Manager. Mr. A. Freedman and Mr. R. Chaffey have been appointed Assistant Chief Designers, Mr. Freedman to take charge of production design, and Mr. Chaffey of development design. Mr. A. W. Culver, who vacates the post of Chief Inspector, which will now be filled by Mr. A. E. G. Sly, returns to his former position of Sales Manager.

Mr. Vernon Alec Murray Robertson, C.B.E., M.C., M.Inst.C.E., M.I.Mech.E., M.Inst.T., President of the Permanent Way Institution, which last week-end celebrated its Diamond Jubilee, was appointed Chief Civil Engineer, Southern Railway, as from February 1 last. Mr. Robertson was born in 1890, and was articled from 1909 to a consulting engineer to the L.N.W.R. In 1912 he became an Assistant to the New Works Engineer, S.E.C.R. He joined the 14th London Regiment (London Scottish) in 1914, and a year later he was gazetted to the Royal Engineers. After continuous service in France from the end of 1915 until May, 1919, he was demobilised with the rank of Major; he won the M.C. and Bar. In 1919 he rejoined the S.E.C.R., but in October of that year entered the service of the G.E.R., with which and the L.N.E.R. he remained until 1928, when he held the position of Divisional Engineer (Southern Division). He then became Civil Engineer to the Underground Railways, and retained that position on the formation of the L.P.T.B. In 1938 he was appointed Chief Engineer (Civil), and, in 1940, Engineer-in-Chief; the latter position, which he resigned to take up his present appointment as Chief Civil Engineer, Southern Railway, entailed the control of all engineering activities of the Board. Mr. Robertson is a Member of Council of the Institution of Civil Engineers, a Member of Council of the Institute of Transport, a Fellow of the Society of Engineers, and a Member of the American Railway Engineering Association.

Mr. V. A. M. Robertson

Chief Civil Engineer of the Southern Railway; President of the Permanent Way Institution, which has just celebrated its Diamond Jubilee

Sir Follett Holt—An Appreciation from Argentina

The following appreciation of the late Sir Follett Holt, by Sir Guillermo Leguizamon, Chairman of the local committees of the Buenos Ayres Great Southern Railway Co. Ltd. and Buenos Ayres Western Railway Limited, has reached us from our correspondent in Argentina :—

With the death of Sir Follett Holt the Argentine Republic in particular, and other Latin-American countries, have lost a fervent friend and one who contributed to the cultural and economic development of Argentina. For over ten years, Sir Follett was the most outstanding personality in the London railway circles connected with South America, both on account of his intellectual prestige and his recognised knowledge of the various problems affecting the countries of the southern part of the Continent, with whose life he became associated when he was 25 years of age. His twenty years' continuous residence in Argentina and Brazil permitted his penetrating and observant mind to acquire a useful experience of the characteristics of those two countries and a feeling of profound sympathy for the destinies of both peoples, to whose progress he devoted the best efforts of his lengthy and fruitful experience.

When Sir Follett commenced his career in Argentina his first impressions were gloomy. The semi-desert, tropical region of La Banda (Santiago del Estero) was not the most propitious for acclimatising a young British university man commencing his professional activities. Nevertheless, he tried to adapt himself to the environment, and among his fellow workers he found support to form a polo club. The taking over of the management of the Entre Rios Railways afforded Sir Follett not only an opportunity of displaying his exceptional qualities as an organiser and leader, but also a thorough knowledge of the characteristics of a population in process of formation.

During his tenure of the management of the Entre Rios Railways, Sir Follett carried into effect a number of schemes of far-reaching importance to the Province, such as the establishment of the ferry-boat service over the Paraná River between Ibicuy and Zárate. Before relinquishing his post he had completed plans for the joint management of the Entre Rios and Corrientes Railways, the successful execution of which he witnessed four years later. After his return to England in 1910, when he was elected a Director of the Entre Rios Railways Co. Ltd., Sir Follett, gifted with a clear intelligence and a quick understanding, great integrity and firmness in his convictions, and exquisite good breeding which won for him respect and sympathy, attained in a short time a prominent position in the City ; and his co-operation was sought by many industrial and financial concerns, the majority of which were connected with the River Plate.

All who had the privilege of counting themselves among Sir Follett's friends will sincerely mourn his passing because few men practised, as he did, loyalty in such a high degree in dealing with his fellow men.

Permanent Way Institution Diamond Jubilee Meetings

As noted in last week's issue of *The Railway Gazette*, the Permanent Way Institution attains its diamond jubilee this year, but, because of wartime conditions, the occasion of necessity had to be commemorated by a restricted programme of events. Three major items, however, were the conferring of Life Membership on sixty members with the longest membership to their credit; the issue of a souvenir booklet; and the staging of exhibitions of photographs, permanent way tools, etc.

First Exhibition—Paddington

The first of these exhibitions, which will be held in London and several large stations in the provinces, and will be on view to the public, was opened at Paddington Station (General Offices) on Friday, June 30, by the President, Mr. V. A. M. Robertson, C.B.E., M.C., Chief Civil Engineer, Southern Railway. Among those present were Messrs. A. S. Quartermaine, C.B.E., M.C., Chief Engineer, G.W.R.; B. P. Fletcher, London District Engineer, L.N.E.R.; C. E. Dunton, Permanent Way Engineer (Railways), L.P.T.B.; E. C. Cookson, Assistant to Chief Engineer, G.W.R.; C. Furber, Mineral Traffic Manager & Development Agent, G.W.R.; W. H. E. Humphrey, Cartage Controller, G.W.R.; M. G. R. Smith, Assistant Divisional Engineer, London Division, G.W.R.; A. E. C. Dent, Road Motor Engineer, G.W.R.; J. A. Kay, Editor, *The Railway Gazette*; Charles E. Lee, Associate Editor, *The Railway Gazette*; Major J. Dewar, Publicity Officer, G.W.R.; H. J. Janes, Hon. Secretary, Permanent Way Institution; and J. A. R. Turner (Southern Railway), Secretary, Diamond Jubilee Committee.

This exhibition will be on view until June 10 and is well worth a visit by anyone interested in the civil engineering branch of railways. The display of permanent way components, etc., with the excellent grouping of photographs showing the various types of works executed by the members of the Permanent Way Institution, has been arranged effectively. Films of permanent way interest are also being shown in an annexe to the exhibition room.

During the afternoon of the same day, a party of members, accompanied by Mr. A. S. Quartermaine, inspected the G.W.R. Sleeper & Creosoting Depot at Hayes. After viewing the adzing, boring, creosoting, and chairing of sleepers, all of which operations were fully explained, tea was provided. At the conclusion, Mr. L. S. Furnivall, on behalf of those present, expressed thanks to Mr. Quartermaine for agreeing to the visit, and for his hospitality and presence with them.

Annual General Meeting

On Saturday, July 1, the annual summer general meeting was held in the theatre of the Institution of Civil Engineers, with the President, Mr. V. A. M. Robertson, C.B.E., M.C., in the chair. A representative gathering of members attended, including four Past Presidents, Messrs. Arthur R. Cooper, R. Carpmael, O.B.E., F. E. Harrison, O.B.E., and W. K. Wallace. Among others present were Messrs. C. J. Chaplin, E. C. Cookson, P. Croom-Johnson, A. Lloyd Davies, J.P. (Vice President), C. E. Dunton, B. P. Fletcher, M.B.E., L. S. Furnivall, T. H. Seaton, C. E. R. Sherrington, M.C., M. G. R. Smith, and A. S. Quartermaine.

Before opening the meeting, the President said that on the occasion of the Diamond Jubilee of the formation of the Institution, he had, on behalf of all members, sent a telegram expressing loyalty and devotion to H.M. The King, and, on arriving that morning a telegram had been handed to him from Buckingham Palace. It read, "Please convey to the Council and Members of the Permanent Way Institution assembled on the occasion of their Diamond Jubilee the sincere thanks of the King for their kind and loyal message and His Majesty's best wishes for the continuance of their work." This gracious acknowledgement was received by members with much gratification.

Membership and Finances

The Secretary (Mr. H. Janes) reported that during the first half-year of 1944 the activities of the various sections had continued to increase to such an extent that, with the exception of one or two localities where special difficulty had been experienced, that phase of the Institution's work was practically back to pre-war standard. Meetings had been held by the Bombay & Western India and South India Sections, and the Sudan Section had resumed activities. At the winter general meeting in January last the President expressed the hope that by the end of 1944 their membership would have reached the record figure of 3,500. To date the number was approximately 3,480, and there was every chance that by the end of the year the President's wish would be fulfilled.

The elections to July 1 were 362, and twenty different sections were represented. From home railways the figures were: L.M.S.R., 129; G.W.R., 73; S.R., 68; L.N.E.R., 47; L.P.T.B., 7. The *Journal* had been issued in the usual way, but paper control prevented it being enlarged to cope with the increasing activity of the Institution. The permanent way text book, "British Railway Track," became available in January, and the demand for copies from both members and others showed how much such a treatise was required.

The Treasurer (Mr. F. Lawson) gave particulars of the finances and reported an approximate surplus of £330 on the year's working after £100 had been placed to the credit of the Benevolent Fund. The cash balance at July 1 amounted to £3,873, compared with £3,282 a year ago. The Council had that morning decided to purchase a further £250 of 3 per cent. Defence Bonds. From the financial viewpoint the future could be contemplated with confidence. The statement of accounts and balance sheet for 1943 were then submitted for approval and were unanimously adopted.

At the request of the President, the Secretary read out the names of the sixty members upon whom Life Membership had been conferred; the aggregate membership of the sixty amounted to 2,025 years. Mr. Robertson then handed a certificate to those who had been able to attend. Among these were two past presidents, Messrs. Arthur R. Cooper and R. Carpmael, O.B.E.

The next item on the agenda was the presentation made to the Honorary Secretary and Honorary Treasurer respectively. Mr. Robertson said that the Council felt, and he was sure that all other members agreed, that the Institution owed to Messrs. Janes and Lawson a great debt of gratitude. Although busy with their normal duties, they yet made time to carry out the business affairs of the Institution, which, as had been heard that day, spread over the whole world, and the work that these two had done was really astounding. In this Diamond Jubilee year the members wished in some way to show their appreciation. He then asked both Mr. Janes and Mr. Lawson to accept, with the very best thanks of the Institution, an illuminated address with a sum in Government securities. The recipients suitably acknowledged the gifts.

Regarding the Diamond Jubilee, Mr. Robertson said that they had hoped to have celebrated it in some fitting manner, but by reason of wartime difficulties, the Council came to the conclusion that until the war was over some features would have to be postponed. Exhibitions of permanent way material, etc., had been arranged, however, and he had the privilege of opening the first one at Paddington on June 30. Similar exhibitions would be staged at points throughout the country.

The souvenir booklet would form a useful memento of the Diamond Jubilee, and he was grateful to Mr. J. A. Kay of *The Railway Gazette* for generously providing the paper for printing, without which it would have been quite impossible to have issued the publication. Thanks were also due to the authors of the articles incorporated in the book.

The Institution was sound and it gave him the greatest pleasure to have been President during the Diamond Jubilee year, and he would like to place on record the thanks of all to the members of the Diamond Jubilee Committee who had made all arrangements for the various special items that were being carried out.

It was decided that the winter general meeting should take place in London on Saturday, January 20, 1945.

On the proposition of Mr. Arthur R. Cooper, a vote of thanks was accorded to the President and Council of the Institution of Civil Engineers for placing accommodation at their disposal.

Mr. W. K. Wallace, Chief Civil Engineer, L.M.S.R., then gave a talk on "Some Engineering Methods Employed by the L.M.S.R." This was supplemented by films showing the building up of a junction for renewal, loading up old material from renewals, and the relaying of 60-ft. rails by 39-ft. American rails. At the conclusion Mr. A. S. Quartermaine voiced the appreciation of those present to Mr. Wallace for his instructive remarks.

Charing Cross Exhibition

On Monday last, July 3, the exhibition at Charing Cross Underground Station was opened by Colonel E. Gore-Browne, D.S.O., O.B.E., T.D., A.D.C., Chairman of the Southern Railway, who was introduced by Mr. V. A. M. Robertson, supported by Mr. T. E. Thomas, General Manager, London Passenger Transport Board. Among those present were Messrs. Fletcher, Furnivall, Janes, Klapper, Lee, Sherrington, Smith, and Turner, as well as many members of the general public. Colonel Gore-Browne emphasised the great importance of the work of the members of the Permanent Way Institution in maintaining the safe and efficient tracks upon which such a large proportion of our war traffics, as well as the passenger and goods traffics that were vital to the ordinary life of the country, were carried, and he paid tribute to the devotion to duty of permanent way men, and indeed to the civil engineering staffs generally, in keeping these lines of communication open under adverse and often dangerous conditions. Mr. Robertson asked Mr. Thomas to accept the thanks of the Permanent Way Institution to the London Passenger Transport Board for making possible this exhibition (arranged jointly with the Southern Railway) at a place where many members of the general public would be able to see something of the work which so efficiently served their essential needs.

TRANSPORT SERVICES AND THE WAR—249

Army Mail Trains

In four months the L.M.S.R. has run 299 special trains comprising 4,000 vans with Army mail. These trains are additional to the "specials" which are being operated regularly by the L.M.S.R. to convey prisoner-of-war parcels.

Exit Permits from Eire

The Government of Eire has resumed the issue of travel permits to Great Britain, but on a restricted basis. Restrictions on travel do not normally apply to clergymen, doctors, engineers, accountants, or workers from the northern, western, and south-western counties.

No Extra Trains for Wakes Weeks

As inquiries continue to be made about the possibility of extra trains being available for Wakes Weeks and similar holidays, the Ministry of War Transport has stated that the announcement already made of reductions in passenger train services must be taken as an indication that no additional trains can be made available for holiday-makers.

Removal of Direction Signs

The Home Secretary has made the Removal of Direction Signs Order, 1944, which relaxes the restrictions on the display of signs indicating place names through the country.

The Orders previously in force prohibited the display of any sign indicating the name, situation, direction, or distance of any place if the sign could be read and understood from a highway, railway train, or low flying aircraft. Under the new Order, prohibition of the display of such signs is now limited to those which can be seen and understood from low flying aircraft. This will allow of the re-erection of large numbers of signs on shops and other business premises; although large-scale signs exhibited on prominent buildings such as factories, warehouses, institutions, etc., continue to be ruled out.

No precise rule can be laid down as to dimensions except that, in the case of a sign displayed in the open in a prominent position so that an uninterrupted view of it could be obtained from a low flying aircraft, the lettering should not exceed 6 in. in height. Under the new Order the exhibition of place names on vehicles is exempted from restriction.

South African Vehicle Position

To assist the South African Railways in dealing with the difficult vehicle position, War Measure No. 81 of 1943 has been promulgated, empowering the Administration to refuse to accept any person or goods for transport on the railways.

Maximum Fares for Canadian Forces

The Canadian Defence Department announced on May 24 the establishment of a $15 maximum for railway fares payable by members of the Armed Forces when travelling home on annual leave or embarkation leave in Canada. The railways and the Federal Government will make up the balance. Thus, members of the Canadian Forces, when travelling on such leave to *bona fide* homes in Canada, will not pay more than $15 for the round trip, whatever distance their homes may be from point of departure. For example, a soldier travelling from Halifax to Vancouver on annual or embarkation leave will effect a saving of $10.45 over the previous round fare of $25.45. For ordinary leave, the Canadian Forces will continue to travel on a return ticket for the price of a single fare.

Steel Rails for U.S.A. Railways

During the year 1943, the War Production Board of the United States permitted the U.S.A. railways to receive a total of 1,538,984 tons of new rail; though considerably short of the quantity which had been sought by the railways, this was well above the 1,260,000 tons allocated in 1942. Of the 1943 total, 387,091 tons went to the Central Western lines, 266,141 tons to the Southern lines, 219,330 tons to the Central Eastern lines, 200,675 to the Great Lakes area, and smaller quantities to other districts. In the depression years from 1930 to 1938 the average tonnage of rail bought by the railways fell to 784,943 tons annually, compared with an average of 1,855,432 tons per annum from 1921 to 1929 inclusive. For 1944 the War Production Board has been asked to allocate a total of 2,200,000 tons.

General Sir Frederick Pile, K.C.B., D.S.O., M.C., General Officer Commanding Anti-Aircraft, on a recent visit to a Southern Railway works to inspect its Home Guard, which includes its own anti-aircraft unit. The General is seen standing on the right, beside the Bofors gun manned by the Southern Railway Home Guard. The locomotive in L.M.S.R. livery in the background was built in these works

New Turkish Air Line

The Paris radio recently announced that a Turkish air line between Ankara and Erzerum was inaugurated during June, but that nine German commercial aircraft which were due for delivery to Turkey had not yet arrived.

The Inter-American Highway

It has been announced officially by the Administrator of the U.S.A. Federal Works Agency that the Inter-American Highway will be opened for all-weather tourist traffic by October, 1946, if the war in Europe should end during the present year. In any event it is unlikely to be completed more than a year later than October, 1946.

Reduced New Jersey Train Services

As reported in our June 16 issue (page 627), by direction of the United States Office of Defense Transportation, the Central Railroad of New Jersey recently cancelled 68 trains in the New York and Jersey City suburban area to facilitate the movement of wartime freight. On April 17, the railway company distributed questionnaires to all its passengers asking their opinion of the service now being run, and whether any adjustment in the times of the remaining 300 trains is desirable. At least 25,000 replies were expected, and these will have been of great value in shaping the timetables which came into operation in mid-June.

The New O.D.T. Director, U.S.A.

On April 4 President Roosevelt appointed Colonel J. Monroe Johnson, a Commissioner of the Interstate Commerce Commission, to succeed the late Mr. Joseph B. Eastman as Director of the United States Office of Defense Transportation. Since Mr. Eastman's death, Brigadier-General Charles D. Young has been Acting Director of the O.D.T., and has intimated his willingness to serve under Col. Johnson as Deputy Director, thus continuing to hold the office that he did under Mr. Eastman. Col. Johnson, who was regarded as the most likely appointment to the Directorship, has had a wide experience as a civil and consulting engineer, and as chairman of various highway commissions; in 1935 President Roosevelt appointed him Assistant Secretary of Commerce, and in May, 1940, he was nominated as Interstate Commerce Commissioner, to which office he was re-appointed, and finally confirmed for a full term in January, 1942. He is a member of the American Society of Civil Engineers, and a Past President of the Society of American Military Engineers.

Reichsbahn Freight Payments

New regulations are now in force on the Reichsbahn concerning the payment of freight on consignments which are delayed as a result of air attacks. The German Railway Traffic Regulations have been amended, so that, when transit is seriously impeded by enemy action, the Reichsbahn is entitled to return a consignment from any intermediate station to the consignors, without asking for their instructions. In such cases, and where the Reichsbahn asks the consignor for instructions regarding the consignment, and its return is required, freight or any other expenses are not payable for either the distance to the point of

delay, or for the return journey. Should the consignor require the goods to be re-despatched to another destination, freight will have to be paid for the distance covered to the station where the goods have been held up and from there to the new destination; on request, the difference between the freight so resulting and the freight originally payable will be refunded by the Reichsbahn. Similar provisions are made under a further amendment of the Railway Traffic Regulations concerning goods delayed under the same conditions, and when the consignee either cannot be established or is not in the position to accept the consignment concerned. However, if in these circumstances, the Reichsbahn asks the consignor for instructions and re-direction to a new destination is required the freight payable is that from the original station of despatch to the original station of destination, in addition to that from the original station of despatch to the new station of destination; on request, the difference between the original freight and the amended freight will be refunded by the Reichsbahn.

Railway Developments in Roumania

The new Bucharest-Urziceni-Faurei railway, to which we referred in our May 12 issue (page 506), is reported to have been opened in November, 1943. The Director-General of the Roumanian State Railways then presented an electrification programme to include 1,864 miles of railway, states the German press. The first line to be electrified would be that between Ploeshti and Brashov.

Construction is said to be going forward on the Bucharest-Craioa section, as we recorded in our June 23 issue (page 650). Before the Russian reoccupation of Trans-Nistria and a large part of Bessarabia, a Faurei-Tecuci link was planned as an extension of the new Bucharest-Faurei line. This would further improve railway access to the parts of Russia until recently in Roumanian hands. Later information is not available.

Transit by Road through Spain

Autotransit, the Swiss road transport organisation responsible for the conveyance of Swiss export consignments in transit through Spain, or of foreign goods (mostly of Transatlantic origin) crossing Spain *en route* for Switzerland, operates its road services between Bilbao and Canfranc on the Spanish-French border, a road distance of 186 miles, which the company's lorries generally cover in a day, without any break. During 1943 the organisation's vehicles made 743 runs, and the distance covered aggregated 327,547 miles. The total of goods conveyed was similar to that handled in 1942, and amounted to 616 metric tons westbound and 6,833 metric tons of goods intended for Switzerland. Consumption of diesel oil totalled about 35,903 gal. in 1943, and wood burned to generate producer-gas aggregated 271,480 lb. Both types of fuel could be obtained in Spain, but tyres had to be provided from Switzerland. The Spanish roads with their hot surfaces are proving detrimental to the tyres made of reclaimed rubber, causing excessive wear. The average number of vehicles in service is nine. The producer-gas vehicles have gradually been eliminated because of the numerous breakdowns experienced with them; repairs entailed keeping of large stocks of spare parts, which had to be obtained from Switzerland as no local supplies were available. Autotransit has been confronted with increasing difficulties and handicaps during the past two years, and the desirability of discontinuing the services and winding up the company has been discussed repeatedly, but the collaboration which the company has received from the Swiss authorities, who are desirous of maintaining this link in the land communication between Switzerland and the Atlantic, has prevented the company from taking any final decision. Particulars of this road service were published in our issue of February 27, 1942, page 314.

Bucharest Local Transport

The municipally-owned Bucharest tram company, Societatea Comunale Tramvaielor Bucuresti (S.T.B.) is bearing the brunt of the local traffic demand of the Roumanian capital. The bus services which were introduced in the 1936-1937 working year had to be discontinued early in the war. Emergency services by private cars and taxis, organised to replace the bus services, are officially stated to have carried some 150,000 passengers a day, but they too had to be discontinued. The development in the length of the tram system between 1933 and 1943 and the increase in the number of tramcars are shown in the following table:—

	Miles	Trams
1933	47	—
1934	51	546
1935	53	546
1936	54	562
1937	64	579
1938	69	573
1939	74	604
1940	74	675
1941	75	714
1942	78	759
1943	89	841

The tram sets consist of an electric car (first class) and a trailer (second class); an additional trailer is often attached during peak hours.

Swiss Timetable Improvements

From May 8 various changes were made in the passenger timetables of the Swiss Federal Railways, intended to continue in force until the corresponding date in 1945. The traffic position in general is a little easier, and the most rigorous wartime restrictions imposed in the timetables of electrified lines have been relaxed. Similarly, on the few lines still worked by steam, there has been some relaxation of "austerity," as slightly better imports of coal have been obtained. The journey times of some trains on main lines have been extended, in consequence of heavier formations to cope with the increased traffic, and longer time required in making connections.

On the other hand, relief is being afforded by the reinstatement of certain *trains directs* which have been greatly missed. The latter include the lightweight high-speed service from Geneva at 1.4 p.m. to Zurich, and from Zurich at 1.19 p.m., to Geneva, *via* Lausanne and Berne, with connections at Olten to and from Basle, and at Berne to and from the Bernese Oberland; and the similar service between Basle, Délémont, Bienne, Neuchâtel, and Lausanne, leaving Basle at 11.30 a.m. and Lausanne at 2.12 p.m. Also, on the Gotthard line, a new lightweight fast service leaves Chiasso at 6 a.m. for Basle and Zurich, reaching the latter before 10 a.m. and Basle and Berne about 11 a.m., with a return evening service from Lucerne to Lugano, Bellinzona, and Chiasso at 7.10 p.m., this greatly improving the communications between the Canton Ticino and the rest of Switzerland. The 7.3 a.m. express from Basle is now running independently of the Zurich section between Arth-Goldau and Chiasso, and similarly the 4.16 p.m. from Chiasso to Zurich and Basle —both very heavily patronised trains— with an acceleration of 20 min. on the through journeys. New communication is given by high-speed railcar between Rorschach (with connection from St. Gall) and Coire, at 9.46 a.m. and 1.27 p.m., returning from Coire at 11.40 a.m. and 3.36 p.m., and so improving connections to and from the Grisons; and there has been some rearrangement of the train service between Basle and Zurich, with the same object in view. Various timetable improvements have been made on other lines, both Federal and private.

In all, the alterations have added 5,350 km. (3,324 miles) to the daily Swiss Federal Railways passenger train mileage, 4,250 km. (2,641 miles) on electrified lines, and 1,100 km. (683 miles) on those still worked by steam. In Switzerland the aggregate distance covered by passenger trains daily is thus increased to 83,200 km. (51,692 miles) in summer, and 81,800 km. (50,822 miles) in winter. Out of 285 requests presented to the Swiss Federal Railways management by cantonal authorities, 112 have been acceded to wholly or in part in this improved timetable, which represents a remarkable administrative achievement in such times as the present.

Locomotive Rebuilding in Sierra Leone

When the first section of railway in Sierra Leone was built, in 1896-99, it was not envisaged that the Colony would become a substantial exporter of produce and minerals in war conditions, and the railway was built as a single-track line of 2 ft. 6 in. gauge. The country was difficult from the constructional viewpoint and numerous ravines necessitated building several steel viaducts in the first few miles. During the present war this railway has been required to cope with enormously increased tonnages necessitated by the enemy occupation of many other territories producing tropical products.

The greatly increased rate of wear and tear has imposed a severe strain upon the Sierra Leone Government Railway Administration, and some indication of the way in which the task has been tackled was given last April to a party of the leading citizens of Freetown, when they paid a 2-hour visit to the railway workshops. These now cover several acres and further extensions are planned. Moreover, the layout of the main machine shop has been completely re-arranged for greater economy and increased efficiency of operation. In the joinery shop, new woodworking machinery has been installed for the mass production of coachwork. Locomotive parts which would normally have been replaced by imports have been reconditioned by welding. Scrap metal has been melted in order to make castings to replace parts that are beyond further repair; these have been machined with precision and efficiency.

One difficulty has been that new locomotives from Great Britain could be supplied only to a standard specification, which did not meet all the local needs, and therefore some standard types have been rebuilt to enable them to haul longer trains of goods wagons without exceeding the maximum permissible axle load of 5 tons on the 30-lb. rails. Two types have been converted successfully. One has produced the only eight-coupled Garratt locomotive for the 2 ft. 6 in. gauge. The other is a ten-coupled tank engine.

Naturally, these activities have increased the demand for skilled African workers, such as fitters, smiths, foundry hands, machine operators, pattern makers, joiners, and so forth. At the same time, the demand for skilled African tradesmen for the Services has reduced the normal source of supply, and, in order to cope with this wartime difficulty, a school for training young men has been established, and equipped with working models of locomotive parts made in the workshops.

XUM

Institution of Railway Signal Engineers

Paper on coded track circuits

At a meeting of the Institution of Railway Signal Engineers held at the Institution of Electrical Engineers, London, on June 28, 1944, with the President, Major R. F. Morkill, in the chair, a paper on the theory and application of coded track circuits was read by Mr. J. P. Coley, Associate Member, and Mr. R. M. Macgregor. (The paper had been circulated to some members beforehand and was read in abstract by Mr. Coley). It was illustrated by full-size apparatus connected to a model track and signals, demonstrating the control of multiple-aspect indications. A series of excellent lantern slides, many of them coloured, was shown. The President referred to the great interest being taken in the code principle as applied to track circuits and the advantages claimed for it, such as higher train shunts and immunity to stray current interference, elimination of cut-sections and line wires. By all accounts, very successful results had been obtained in America with this kind of equipment. The question of maintenance of the apparatus required some consideration; it was more extensive and involved than the track circuit apparatus to which they had become accustomed.

Mr. G. H. Crook, Past President, thought members would be interested to know that some coded track circuit was already in trial use on the G.W.R.; several ordinary track circuits had been joined to form one coded circuit over 2,000 yd. long working under not too favourable local conditions; a reasonable train shunt was easily obtained, equal to, or even better than, that ruling before the conversion, as they now got the prevent shunt effect. As to prospects for the method, he thought conditions in most interlocked areas in this country were such that the code principle was scarcely necessary, but there were locations—such as tunnels, or long open sections of line—where it might find a useful field.

Mr. H. J. Riddle found the code principle fascinating, opening numerous possibilities for the future. He referred to a number of technical details and asked questions concerning the voltage, current consumption, inductance and capacity characteristics of the components of the equipment, which was, he considered, a unique application of the theory of tuned circuits. He was interested in the electrolytic action in the track circuit, to which American reports made reference.

Mr. F. Horler wished to know the relative advantages of the various code systems, the frequency, time and polar bias, and the circumstances in which a particular one was selected for an installation.

Mr. R. M. Macgregor, joint author of the paper, replied in some detail to the points raised and described the features of the layout set up for members' inspection.

The President, moving a hearty vote of thanks to the authors, said the paper was a particularly important contribution to the Institution's proceedings. He also announced that a luncheon would be held at Derry & Toms, Kensington, on July 28, when the guests of the Institution would be Colonel N. A. Ryan and Lt.-Colonel Morris, U.S.A. Transportation Corps; Mr. C. E. R. Sherrington, Secretary, Railway Research Service; and Monsieur Jean Lévy, Chief Mechanical Engineer, French National Railway Company.

The Battle of the Gauges

At a recent meeting of the Railway Club, held at 57, Fetter Lane, E.C.4, the President, Mr. Kenneth Brown, read a paper entitled "The Battle of the Gauges," which is of topical interest at the moment in view of the fact that it is just one hundred years since the meeting of the broad and narrow (now standard), gauges at Gloucester resulted in the appointment of the Gauge Commission. Mr. Kenneth Brown dealt with the subject from a new angle, in the light of an unique collection of documents which had recently come into his possession, consisting of a complete file of literature issued by the well-organised, but secret, "propaganda department" of the narrow-gauge party.

The lecturer observed that there would not appear to be any logical reason why the precise dimensions of 4 ft. 8½ in. became the standard gauge, and he suggested that its adoption was largely fortuitous, in the same way that many years later the size of cinematograph films was adopted by chance. George Stephenson favoured a 4 ft. 8½ in. probably because it happened to approximate to the gauge of the colliery railway upon which he worked, and upon which he placed his first steam locomotive. The precise gauge of this Killingworth Colliery Railway was 4 ft. 8 in., as was also that of the Stockton & Darlington Railway. The Rennies favoured 5 ft. 6 in. and, according to the "Autobiography of Sir John Rennie" (1875), the gauge of the Liverpool & Manchester Railway would have been 5 ft. 6 in. had the services of the Rennies been retained. In fact, George Stephenson built the line and adopted 4 ft. 8½ in. which has since spread throughout a large portion of the world.

When the question of constructing railways on the Continent came to be considered, Stephenson was consulted about the gauge, and naturally recommended 4 ft. 8½ in., as he knew that his own and other British locomotive works would wish to supply engines, and it would be of convenience to them to have the same gauge as in Great Britain. In Ireland, various gauges were recommended, but quite early in Irish railway history 5 ft. 3 in. was adopted and is now the Irish standard.

When the G.W.R. decided to use its famous broad gauge of 7 ft. 0¼ in. advocated by Brunel, no difficulty was expected by reason of the difference from other lines, as it was considered that the G.W.R. would serve a self-contained area, and in 1845 the Gauge Commissioners in effect subscribed to that view. In that year, the mileage of narrow-gauge lines was seven times that of broad gauge, and the Gauge Act of 1846 prohibited the construction of railways to a gauge of other than 4 ft. 8½ in. in Great Britain, excepting in the area of the G.W.R., without specific parliamentary authority. The last broad-gauge victory was in 1848 when the G.W.R. was authorised to extend its broad-gauge line to Birmingham and Wolverhampton. In passing, Mr. Kenneth Brown mentioned that Brunel himself agreed to the standard gauge for the construction of the Taff Vale Railway, a fact of which much was made by the narrow-gauge party. The Eastern Counties, the Northern & Eastern, and the London & Blackwall Railways all adopted the 5-ft. gauge, but these companies saw the "red light" when the Midland Railway obtained powers to run to Peterborough; they therefore converted their gauge to the standard.

The most interesting feature of the lecture was the clear demonstration that the gauge difficulties at Gloucester which were mainly responsible for the appointment of the Gauge Commissioners were intensified as deliberate propaganda by a highly-organised publicity scheme maintained by the narrow-gauge party. Efforts were made to secure the publication of highly-coloured articles in favour of uniformity of gauge, which, in view of the preponderating mileage of the 4-ft. 8½-in. gauge, was synonymous with extinction of the 7-ft. gauge. Copies of these were distributed to editors of other journals at the same time that advertisements for meetings were placed. The lecturer contended that the difficulties caused by the break of gauge at Gloucester were much exaggerated and that, so far as passengers and their luggage were concerned, there was no more inconvenience in changing from a broad-gauge train to a narrow-gauge train at Gloucester, than there was in changing from one narrow-gauge train to another at Crewe. Narrow-gauge rails were laid to Paddington in 1861 but the broad gauge survived for another 31 years, and the last broad-gauge train left Paddington in 1892.

In the discussion after the lecture it was emphasised that present restrictions are much more a question of the restricted loading gauge of British railways—based originally on the dimensions of a normal load of hay—than upon the track gauge or distance between the rails.

LOUD SPEAKERS AT QUEEN STREET, GLASGOW.—The L.N.E.R. has installed at Queen Street Station, Glasgow, both high level and low level, a system of loud-speakers for broadcasting information regarding outgoing and incoming trains. The system was inaugurated on June 27 by Mr. R. Gardiner, Superintendent, Scottish Area, and comprises 56 loudspeakers.

HAULAGE BY RAIL OF SEED POTATOES.—For the present season's potato crop, the L.M.S.R. and L.N.E.R. conveyed by rail throughout 235,000 tons of seed potatoes from Scottish farms to the potato-growing districts of England. This represented, at the height of the season, four train loads a day. In addition, 91,000 tons were carried by the two railways to ports in Scotland for shipment to England. In the middle of winter each wagon had to be covered with two sheets to protect the potatoes from frost. Both sheets and wagons were in heavy demand for other urgent traffics, but priority was given to the transport of seed potatoes, and special trains of empty wagons and sheets were run from other parts of the country, and staff was allocated specially to ensure adequate distribution. The 326,000 tons of seed potatoes carried by rail should produce about 2,600,000 tons of eating potatoes this year.

Railway Control Agreement

Text of correspondence between the railway companies and the Ministry of War Transport

On April 20, the Chairman of the four main-line railway companies had a meeting with the Minister of War Transport for the purpose of discussing the following memorandum which they had previously sent him :—

From the Railway Companies' Association to the Minister of War Transport, April 19, 1944

" The Minister will be aware that, in the original draft railway Agreement, provision was made by which the Minister or the railway companies could propose a revision of the arrangements for any cause of a major character and, if agreed by all parties, the arrangements should be revised accordingly. While a provision of this nature could have no legal significance and was for this reason not embodied in the revised agreement, it was made clear during the course of the negotiations that the Government did not wish to depart from this understanding as, if new circumstances arose, it might again require the agreement to be amended.

" Since the revised agreement was made, two new circumstances of a major character have arisen. On December 9, 1941, war was declared on Japan and two days later Germany and Italy declared war on the United States. These two events have resulted in a far greater burden being thrown on the railways than was expected at the time the agreement was negotiated.

" The Minister will remember that although the railway companies, in the national interest, accepted the revised agreement as a wartime measure and without regard to the ordinary commercial considerations which would have to be taken into account in determining the amount of compensation to be paid for the use of the undertakings, either individually or collectively, under normal conditions, they, at the same time, made it clear that the minimum guaranteed annual payment was the lowest which could be accepted without grave injustice to their proprietors.

" Notwithstanding the fact that charges have not been increased to cover the enhanced costs of labour and materials, the profit accruing to the Government has far exceeded anticipation. For the last three years the net earnings of the four main-line railways, the London Passenger Transport Board and the minor railways have been in excess of the £43½ millions payable by the Government under the revised agreement, as follows :—

	£
1941	21,700,000
1942	45,700,000
1943	62,000,000

" While these figures are subject to adjustment for abnormal wear and tear, the increase in earnings is undoubtedly due to circumstances not contemplated at the time the agreement was made, and, therefore, the new arrangements have proved to be more unfavourable to the proprietors than would have been the case had the original agreement still obtained.

" The Chairmen have hitherto not submitted for the Minister's consideration a request for a further revision of the agreement having regard to prevailing conditions and the uncertainty of the future, but, as strong representations were made at all the recent annual general meetings of proprietors that the present arrangements inflict a grave injustice on them, the Chairmen feel it to be their duty to acquaint the Minister of the urgent views of the proprietors that he should review the agreement in the light of the altered conditions and make such adjustments as may be necessary to afford them equitable treatment.

" For the reasons outlined the Chairmen request that adjustment should be made in two directions :—

(i) The guaranteed annual payment should be increased ; and
(ii) The basic figure for maintenance should be adjusted to cover the intensified user of maintainable assets.

" The great expansion of traffic has naturally caused a more intensive use of the capital assets employed, and it is inequitable that the basic figure for maintenance should, in these circumstances, be limited to the levels of the years 1935-6-7."

After discussion of the railway companies' submissions, the Minister undertook to write the Chairmen on them and did so in the following letter of June 16 to Lord Royden, Chairman of the Railway Companies' Association :—

From the Minister of War Transport to Lord Royden, June 16, 1944

" I am now in a position to reply to the representations which you and the Chairmen of the other main-line railways put before me when you waited on me on April 20 to acquaint me with the views expressed by the proprietors in regard to a review of the financial terms of the Railway Control Agreement.

" The request took the form of asking for an increase in the guaranteed annual payment and for some adjustment of the basic figure for maintenance to cover the intensified user of maintainable assets, and it was suggested that the extension of the area of the war which occurred at the end of 1941 constituted a case for revision.

" The Government does not find itself able to accept this suggestion and I feel bound to point out that the revised arrangement into which we entered in the course of 1941 was such as to relieve the railways of uncertainty as to the effects of the war upon their net revenues. As my correspondence with Sir Ronald Matthews shows, the companies' acceptance of the fixed annual payment of the agreed amounts was for the period of control. The Government has given the most careful consideration to the views which you placed before me and regrets that it is unable to agree to any increase in the amount of the fixed annual payments.

" We must adhere to the agreement, but I may remind you that it makes provision for an allowance for abnormal wear and tear of maintainable assets, if it is agreed to be justified, over and above the basic figure for maintenance. Although I cannot commit myself in any way until the matter has been fully investigated, I am prepared to examine it with you without delay."

To this letter the following reply was sent by Lord Royden to the Minister on June 30 :—

From Lord Royden, to the Minister of War Transport, June 30, 1944

" The Chairmen of the railway companies have had an opportunity of discussing your letter to me of June 16 regarding their request for a revision of the financial terms of the present railway agreement.

" At the annual general meetings of all the companies this year the stockholders passed resolutions calling on the Boards to express to you, and through you to the Chancellor of the Exchequer, their opinion that the Railway Control Agreement is inequitable and should be revised in such a manner as shall enable the main-line companies to receive the standard revenue under the Railways Act of 1921.

" You will, I feel sure, appreciate the disappointment which the Government's decision will cause, not only to the railway stockholders, but also to those who represent them.

" The railway Chairmen welcome your assurance that the question of allowances for abnormal wear and tear of maintainable assets will be fully investigated."

(*See editorial article, page* 3).

Bengal-Nagpur Railway Co. Ltd. Annual Meeting

The ordinary general meeting of the Bengal-Nagpur Railway Co. Ltd. was held on June 29, at 132, Gresham House, London, E.C.2. Sir George C. Godfrey, Chairman & Managing Director of the company, presided.

The following is the Chairman's statement circulated with the accounts:—

Again our annual meeting and the report to members have been unavoidably delayed, partly due to the mail services and partly to discussions about certain charges and taxation which affect the company's share of surplus profits. The latter is shown in the report as amounting to Rs. 20,74,461, equivalent to £155,584. This good result is by no means altogether due to wartime rates and weight of traffic. For a long period of years, as shareholders are aware, we carried traffic to and from the various steel works at low concession rates and when the concession agreements terminated the company was able to raise rates on a very heavy tonnage and is now receiving a well-earned reward for this long-sighted policy.

I am afraid the results of the year ended March, 1944, will not be so good, mainly because of the heavy loss sustained in selling food and cloth to railway staff throughout the whole line at prices considerably below purchasing rates.

The financial losses to the railways and to all industrial and commercial concerns were bad enough, but are negligible compared with the disastrous famine conditions created over vast areas of the country, which, in my opinion, might have been prevented or at least alleviated by more prompt measures of central control. It is not expected that the heavy expense of feeding the staff will continue, but the increases of wages which have been granted are not likely to be removed for some years, if ever.

The staff in India has been working short-handed, but has succeeded, most successfully, in meeting the calls upon the railway to handle additional traffic, and in running extra trains to assist railways that were overcrowded or temporarily interrupted. We owe an expression of thanks and appreciation to Mr. Fitzgerald, the agent and general manager, and all his staff from top to bottom for their great efforts and successful results.

The report was adopted.

XUM

Questions in Parliament

Railway Control Agreement

Sir John Mellor (Tamworth—C.) on June 28 asked the Parliamentary Secretary to the Ministry of War Transport whether he had considered the recent representations from the railway companies on behalf of their junior stockholders that the financial provisions of the existing control agreement should be revised; and whether he would make a statement.

Mr. P. J. Noel-Baker (Parliamentary Secretary, Ministry of War Transport): Yes, sir. The Minister of War Transport has met the Chairman of the four railway companies. They presented to him the views expressed by their proprietors in favour of a review of the financial terms of the Railway Control Agreement, and they suggested that the extension of the area of the war at the end of 1941 constituted a case for revision. They asked for an increase in the guaranteed annual payment and for some adjustment to cover intensified user of maintainable assets. In reply, Lord Leathers has pointed out that the revised arrangement made in 1941 relieved the railways of uncertainty as to the effects of the war on their net revenues and he has stated that the Government is unable to regard the extension of the war area as a reason for revision or to agree to any increase in the amount of the fixed annual payments. The control agreement itself enables an allowance, over the basic figure for maintenance, to be made for abnormal wear and tear of maintainable assets, if such allowance is shown to be justified, and Lord Leathers has offered to examine this matter.

Sir J. Mellor: As the control agreement deprives some of the junior stockholders of all possibility of dividends for the duration of the war and for one year thereafter, is it fair to insist on this financial arrangement continuing indefinitely?

Sir Irving Albery (Gravesend—C.): Will His Majesty's Government in view of the very important war services rendered by the railway companies—(cries of "And by the men")—and by the men, treat them as fairly as other war industries which, in many cases, are allowed to earn profits of 10 to 12 per cent.?

Mr. Noel-Baker: I cannot now argue the merits of the revised control agreement, but the Government has always held that it was fair and just.

Mr. F. C. Watkins (Hackney Central—Lab.): Is not the trouble mentioned in the question due to the over-capitalisation of the railways? If their capital structure was re-formed, is it not a fact that this trouble would not arise?

Mr: Noel-Baker did not reply.

(*See editorial article, page 3*).

Bombay and Baroda Railways

Mr. H. Graham White (Birkenhead East—Lib.) on June 29 asked the Secretary of State for India the reason for the delay in the winding-up of the Bombay and Baroda railways; what the present position was; and if the procedure was being carried out under the Companies Acts.

Mr. L. M. S. Amery (Secretary of State for India): The delay is, I am informed, mainly due to difficulties in ascertaining the company's share of profits for the final period during which it managed the railway and in determining the company's final tax liabilities both in India and the United Kingdom. It is hoped to complete the winding-up in the course of the present year. The dissolution of the company is being carried out under the provisions of the Bombay, Baroda & Central India Railway Act, 1942, not under the Companies Acts.

Mr. White: If the Minister's expectation of an early settlement of this affair is not reached, would it be possible to issue an interim statement?

Mr. Amery: I will look into that, but it may be difficult.

Notes and News

Butterley Co. Ltd.—Net profit for the year to March 31, 1944, was £109,260, to which is added £65,042 brought forward, making £174,302. Final dividend on the ordinary capital is 8½ per cent., less tax, making 12 per cent., less tax, for the year. The amount carried forward is £66,302.

South African Railways Passenger Traffic.—All passenger records were broken during the first week of April by the South African Railways. Revenue from passenger traffic during the week, which amounted to £353,985, eclipsed the previous record of £304,519 established during the week ended January 8, 1944, by £49,466.

Antofagasta (Chile) & Bolivia Railway Co. Ltd.—The directors announce that the balance of net revenue account for 1943 is £377,856, against £271,727 for 1942. This figure is arrived at after making provision for income tax, etc., a full year's interest on the debenture stocks, and contributions to the renewals and staff benevolent funds. The balance of £377,856 is to be carried forward.

J. Stone & Co. Ltd.—The report for the year 1943 shows that after making allowance for depreciation, etc., and payments under the War Damage Act, the amount carried to the credit of profit and loss is £238,305 (£232,126), to which is to be added £319,441 brought forward, making a total of £557,746. A sum of £50,000 is transferred to reserve account, and the ordinary dividend for the year is 25 per cent. (same). The amount carried forward is £318,646.

Skefko Ball Bearing Co. Ltd.—Sir Ralph Glyn, M.P., presiding at the 34th annual general meeting, said that the company's progress had been well maintained, and he could assure the meeting that everything possible had been done to utilise the resources of the organisation in the national interest. The pension and life assurance scheme envisaged for male workers in the factory had been established during the past year. The directors wanted to put on record their high appreciation of the work that had been done by the management and by all the staff and employees of the company. After the war it would be possible to give the shareholders a full account of what had been accomplished in the way of production and how many difficult problems had been successfully dealt with.

S.R. Extension of Time Application.—The Southern Railway Company is applying to the Minister of War Transport for an order under the Special Enactments (Extension of Time) Act extending by three years from October 1, 1944, the time now limited by:—(1) Section 54 of the Southern Railway Act, 1939, for the completion of the Folkestone-Dover deviation railway authorised by the Act of 1934; (2) the Southern Railway (Extension of Time) Order, 1941, for the acquisition of lands (*a*) at Twickenham, Rochester and Okehampton, (*b*) of lands required for widenings authorised by the Act of 1926 in Camberwell, Deptford, Millbrook, Southampton and Bournemouth, (*c*) of lands required in Heston and Isleworth for the bridge lengthening and alteration authorised by the Act of 1929.

Canadian Pacific Railway.—Gross earnings of the Canadian Pacific Railway for the month of May, 1944, amounted to $27,317,000, an increase of $3,112,000 in comparison with May, 1943. Working expenses advanced by $2,955,000 to $22,847,000, and the net earnings of $4,470,000 were $157,000 higher. Aggregate gross earnings from January 1 to May 31, 1944, were $127,918,000, an

British and Irish Railway Stocks and Shares

Stocks	Highest 1943	Lowest 1943	Prices July 4, 1944	Rise/Fall
G.W.R.				
Cons. Ord.	65½	57¼	61½	+ ½
5% Con. Pref.	120½	108	119½	— ½
5% Red. Pref. (1950)	110½	106	105	— ½
5% Rt. Charge	137½	123½	131½	— ½
5% Cons. Guar.	135½	121 7/16	131½	—
4% Deb.	118	107½	114½	—
4½% Deb.	119	109 7/16	115½	— 2½
4½% Deb.	124½	116	120½	— 2½
5% Deb.	138	127	133½	— 2
2½% Deb.	77	72½	74½	— 1½
L.M.S.R.				
Ord.	34 13/16	28	31½	—
4% Pref. (1923)	66½	58	61	—
4% Pref.	80½	73	79	—
5% Red. Pref. (1955)	105½	102	103½	+ ½
4% Guar.	107	96½	103½	+ ½
4% Deb.	109½	103½	106½	— ⅜
5% Red. Deb. (1952	111½	108	109½	—
L.N.E.R.				
5% Pref. Ord.	12 7/16	7½	9½	— ⅜
Def. Ord.	5½	3½	4½	— ⅜
4% First Pref.	66½	57½	61	— ⅜
4% Second Pref.	36½	30½	33½	— ⅜
5% Red. Pref. (1955)	99½	93	100½	— ⅜
4% First Guar.	102½	94	100½	— ⅜
4% Second Guar.	93½	85½	92	— ½
3% Deb.	86½	78½	83	—
4% Deb.	109 7/16	101½	105½	+ ½
5% Red. Deb. (1947)	106½	102	103	— ⅜
4½% Sinking Fund Red. Deb.	108	103½	105½	+ ½
SOUTHERN				
Pref. Ord.	80	72½	78	— 1
Def. Ord.	26½	20½	25½	— ½
5% Pref.	119½	106½	118½	+ ½
5% Red. Pref. (1964)	114	108½	114½	+ ½
5% Guar. Pref.	136	122	131½	—
5% Red. Guar. Pref. (1957)	117	109½	114½	— ½
4% Deb.	117½	106	112½	+ ½
5% Deb.	137	126	132½	— 1½
4% Red. Deb. (1962-67)	112	106½	109½	+ ½
4% Red. Deb. (1970-80)	112	107	109½	—
FORTH BRIDGE				
4% Deb.	109	104½	104	— 3
4% Guar.	105	102½	102½	— ½
L.P.T.B.				
4½% "A"	125 11/16	114	121½	—
5% "A"	133 7/16	123	130½	+ ½
3% Guar. (1967-72)	100½	97	99	+ ⅜
5% "B"	124	114	121½	+ ½
"C"	72	53	72	—
MERSEY				
Ord.	34½	27	33½	—
3% Perp. Pref.	69	59½	69	— 1
4% Perp. Deb.	104	102½	103	— 1
3% Perp. Deb.	83	78½	79	— ½
IRELAND*				
BELFAST & C.D.				
Ord.	9	6	9¼	+ ¼
G. NORTHERN				
Ord.	24½	16	26	—
Pref.	—	—	44	—
Guar.	—	—	65	—
Deb.	—	—	85½	+ ½
G. SOUTHERN				
Ord.	30	9½	50	—
Pref.	30	11	50	— ½
Guar.	64	26½	70	—
Deb.	88½	51⅜	93⅜§	— 5½

* Latest available quotations § ex-dividend

increase of $16,385,000 in comparison with the first five months of 1943, and the net earnings of $18,142,000 showed an improvement of $1,360,000.

Institute of Transport Examination Papers.—The question papers set for the 1944 examinations of the Institute of Transport have been reprinted in booklet form, and copies may be obtained from the Institute, 15, Savoy Street, London, W.C.2, price 6d. a copy, post free.

Vera Cruz Terminal Co. Ltd.—The Secretary to this company points out that the statement on page 658 of *The Railway Gazette* of June 30, to the effect that the terminal company is owned by the Interoceanic Railway Company, is inaccurate. Of the 18 shares which may be said to represent proprietary interests, only 4 are held by the Interoceanic Railway.

Rhodesia Railways Limited.—Approximate gross receipts for the month of April, 1944, were £503,632, as compared with £479,376 for April, 1943. For the seven months ended April 30, 1944, the approximate gross receipts amounted to £3,711,923, as compared with £3,424,623 for the corresponding period in the previous financial year.

Hotel Registration in Eire.—In connection with the scheme of the Irish Tourist Board for the registration and "toning-up" of hotels, the *Irish Times* states that after inspection only about 12 per cent. of the total number of applications were turned down. Hotels and guest houses refused registration will not be allowed to use the name of hotel or guest house. It is hoped that the Board will be able, when circumstances permit, to arrange the hotels and guest houses in grades, following the practice in many continental countries.

Ruston & Hornsby Limited.—For the year ended March 31, 1944, the net profit, less reserve for E.P.T., amounted to £310,913 (£312,121). After charging debenture interest, etc., £18,428, and including £60,988 brought forward, there is £353,473 for allocation. Deductions are made of £141,420 (£139,656) for income tax, £15,000 (£10,000) for pension reserve, and £25,000 (same) for reserve for contingencies, and £22,813 (£30,000) is transferred to general reserve. The dividend on the ordinary stock is again 12½ per cent., less tax, and £60,615 is carried forward.

Injuries to Passenger Alighting.—In a recent case in the Ulster King's Bench Division Mr. John F. Kearns sued the Belfast & County Down Railway Company in respect of injuries received on November 27, 1943, when he alighted from a train at Sydenham Station. Evidence for the plaintiff was to the effect that the train stopped and he was in the act of alighting when it gave a lurch forward, throwing him on to the platform. The company denied negligence and called evidence in support of the submission that the train did not stop and re-start. The judge came to the conclusion that plaintiff had stepped off the train before it had stopped, and gave judgment for the railway company, with costs.

Producer Gas.—At the recent annual general meeting of the North Western Road Car Co. Ltd., the Chairman (Mr. J. S. Wills) said that the company was one of the pioneers in the use of producer gas as an alternative to liquid fuels. Twenty-four vehicles had been altered and equipped to operate on producer gas, and during the past year 271,426 vehicle miles were run on this fuel, representing a saving of more than 37,000 gal. of petrol. At the company's main depot at Stockport a building had been erected, specially designed and equipped for servicing and fuelling gas producers. Despite the extensive experience the company had now obtained in the use of producer gas, it was not felt that this alternative fuel had yet proved itself to be anything more than a purely war-time expedient.

Callender's Cable & Construction Co. Ltd.—After charging all expenses and providing for taxation on profits earned to date, the net profit for the year 1943 was £465,115 (£451,031). Adding the balance of £306,552 brought forward makes £771,667. A transfer of £175,000 is made to reserve for war contingencies, and the final dividend on the ordinary stock is 10 per cent., less tax, making 15 per cent., less tax, for the year. A cash bonus of 5 per cent. is also payable, making a total distribution of 20 per cent., less tax, the same as for 1942. The carry forward is £315,884.

International Railways of Central America.—The income statement for the month of May, 1944, shows that railway operating revenues were $686,472, an increase of $39,640 in comparison with May, 1943, but that the net revenue of $283,660 from railway operations was $46,888 lower than for May, 1943. The net income of $177,061 showed a decrease of $21,916. Aggregate railway operating revenues from January 1 to May 31, 1944, amounted to $3,671,841, an increase of $359,197. Net revenue from railway operations was, however, $33,270 lower, at $1,743,931. Aggregate net income amounted to $1,092,563, an increase of $6,559.

L.M.S.R. New Canteen at Manchester.—Mr. E. G. Garstang, District Goods Manager, Manchester, L.M.S.R., on June 29 opened a staff canteen at the Liverpool Road Goods Depot, Manchester, of that company. An existing building has been adapted to form an up-to-date canteen with accommodation for 166 persons at a sitting and with a fully-equipped kitchen capable of supplying 600 cooked meals a day. The canteen will provide service between midnight and 7 p.m. for the staffs of all departments of Liverpool Road and neighbouring depots.

W. T. Henley's Telegraph Works Co. Ltd.—Balance on trading account for the year 1943, after providing for taxation, bad debts, contingencies, and special war expenditure was £438,209 (£420,654). Deducting £83,643 for fees and depreciation, and adding £386,655 brought forward, makes a total of £741,221 (£709,155). Transfers are made of £13,247 (nil) provision for special depreciation and obsolescence, of £50,000 (same) to war contingencies reserve, and of £10,000 to staff pension fund. Final dividend on the ordinary stock is 10 per cent., making 15 per cent. for the year, and a bonus of 5 per cent. is also to be paid. The amount to be carried forward is £398,974.

New York Central "Mohawk" Locomotives

MODERN MOTIVE POWER
Latest New York Central locomotive weighs only 198½ tons. Yet develops 5,400 h.p. . . . ample for heavy freight on Water Level Route.
LEVER OPENS FIREBOX DOORS
STOKER CONTROLS
WHISTLE VALVE
TRACK PAN SUPPLIES WATER
AIR BRAKES
SIX-FOOT DRIVERS
"GREEN OVER GREEN." The fireman shouts his readings of signals to the engineer as a double check. It's also part of his training as a future engineer.
POWER-OPERATED REVERSE GEAR
EXPERT HAND ON THE THROTTLE. Though New York Central engineers average 20 years' experience, each must pass frequent tests for physical fitness and knowledge of train operating rules.
15,500-GALLON WATER TANK
NO MORE SHOVELING. This automatic stoker feeds the fire at a twist of the fireman's wrist.
600 MILES ON A TENDERFUL. The "Mohawk" of today pulls a passenger train 600 miles on one tender of coal. It gets ⅓ more power per ton than engines of World War I.
AUTOMATIC TRAIN CONTROL. Electric control on right of tender would automatically stop the train if a caution or red signal were passed . . . one of many modern safety devices on every "Mohawk."
New York Central
One of America's Railroads All United for Victory
NEW YORK CENTRAL SYSTEM
LET YOUR DOLLARS FIGHT INFANTILE PARALYSIS

A further example of an interesting series of advertisements issued by the New York Central System

Railway Stock Market

Although business generally was on a moderate scale, stock markets have been firm, and values in most sections again showed an upward trend, the small amount of selling reflecting confidence and willingness to take more than a short view. Industrial shares continued to be favoured on hopeful assumptions as to post-war prospects. British funds remained firm and inclined to move higher in price. Home rails moved contrary to the general tendency as a result of the Government decision against revision of the railway rental agreement. Revision of the latter had not been generally expected in responsible quarters, but there had been a little speculative buying of some stocks on this possibility, particularly L.N.E.R. preferred ordinary and deferred, which have now reacted moderately in price. Revision of the agreement would be a much more complicated matter than is apparently often supposed. Nevertheless, it bears hardly on holders of L.N.E.R. deferred and preferred because they are precluded from any dividends. Moreover, as has been pointed out before, these stocks are the only equity securities of an important undertaking playing a vital part in the war effort which are precluded from receiving any distribution.

On the other hand, if the railways are treated fairly in respect to post-war problems, it should be possible for the stocks to receive dividends in the future, and they may therefore not be without possibilities from the long-term angle. Moreover, in that event L.N.E.R. second preference would, of course, receive its full 4 per cent., as against the 2¾ per cent. under the rental agreement. Demand for revision of the rental is not likely to subside, bearing in mind the knowledge that the railways are even more actively employed and that in the current year there is likely to be a further big jump in the proceeds received by the Government from this source. It is difficult to see how, under existing conditions, L.N.E.R. deferred and preferred could be brought into the dividend list without at the same time allowing for increased payments on the junior stocks of the other main-line railways. The promise of the Government as to the matter of additional allowances in respect of wear and tear resulting from exceptional wartime traffic is welcome, because this is an important matter for the future of the railways and partly explains the sums for contingencies allocated out of annual earnings by the L.M.S.R. and L.N.E.R. These allocations are, however, expected to be continued as a matter of caution and prudence, and no improvement in dividends on L.M.S.R. ordinary and L.N.E.R. second preference therefore seems likely so long as the fixed rental persists.

Compared with a week ago, Great Western ordinary moved back from 61¼ to 61, but the 5 per cent. preference was maintained at 119½, and the 4 per cent. debentures at 114½. L.M.S.R. ordinary was fractionally lower at 31¼, and the senior preference also eased from 79½ to 79 and the 1923 preference from 61½ to 61; but as in the case of other home railway stocks there was very little selling. The rather lower quotations arose mainly from the adverse effect on sentiment of the Government decision against revision of the rental. In accordance with the general trend, L.N.E.R. second preference eased from 33¾ to 33⅛, and the first preference from 61½ to 61; but later, buying tended to be attracted by yield considerations. Prior charge stocks generally were well maintained, their investment quality and favourable yields being generally recognised. Elsewhere, Southern deferred reacted from 25⅜ to 25⅛ and the preferred declined half-a-point at 78; the 5 per cent. preference was maintained at 118½. London Transport "C" was 71½.

Argentine railway stocks remained neglected with sentiment reflecting the knowledge that indications point to any solution of the special problems of the British-owned railways being unlikely until the end of the year. Until these problems have been met by the authorities in Argentina it is difficult to assess the outlook for the preference and ordinary stocks. Various debentures, however, received attention, including Argentine Great Western 5 per cents. at 57¼, and B.A. & Pacific 4½ per cents. at 56¼, but prices eased later on further Argentine Press views as to the question of "nationalisation" of the railways. Elsewhere, San Paulo ordinary remained at 47, but Nitrate Rails strengthened to 70s. United of Havana debentures eased to 27, and Canadian Pacifics to 15¾.

Traffic Table and Stock Prices of Overseas and Foreign Railways

	Railways	Miles open	Week ending	Traffic for week: Total this year	Traffic for week: Inc. or dec. compared with 1942/3	No. of Weeks	Aggregate traffics to date: Totals 1943/4	Aggregate traffics to date: Totals 1942/3	Aggregate traffics to date: Increase or decrease	Shares or stock	Prices: Highest 1943	Prices: Lowest 1943	Prices: July 4, 1944	Prices: Yield % (See Note)
				£	£		£	£	£					
South & Central America	Antofagasta (Chile) & Bolivia	834	25.6.44	29,980	+ 7,180	26	729,980	698,140	+ 31,840	Ord. Stk.	15¾	10	10½	Nil
	Argentine North Eastern ...	753	24.6.44	14,982	+ 966	52	762,534	652,146	+ 110.388	..	7⅞	5	4½	Nil
	Bolivar	174	May, 1944	5,459	— 206	21	26,518	27,546	— 1,028	6 p.c. Deb.	22½	18	17½	Nil
	Brazil	—	—	—	—	—	—	—	—	Bonds	23¾	19	15½	Nil
	Buenos Ayres & Pacific ...	2,807	24.6.44	98,460	+ 17,460	52	5,584,020	5,128.380	+ 456,640	Ord. Stk.	8½	5¼	5⅝	Nil
	Buenos Ayres Great Southern	5,080	24.6.44	133,200	+ 8,700	52	9,034,860	8,264,940	+ 769.920	Ord. Stk.	17¼	9½	11	Nil
	Buenos Ayres Western ...	1,930	24.6.44	69,300	+ 17,880	52	2,949,240	2,794,080	+ 155.160	..	16	9⅝	9⅝	Nil
	Central Argentine	3,700	24.6.44	153,888	+ 54,960	52	7,918,362	6,748,401	+ 1,169,961	..	10¾	6½	7⅞	Nil
	Do.	—	—	—	—	—	—	—	—	Dfd.	4⅝	3	3½	Nil
	Cent. Uruguay of M. Video	972	24.6.44	36,413	+ 7,111	52	1.765,224	1,557,852	+ 206,372	Ord. Stk.	7⅞	4½	4½	Nil
	Costa Rica	262	May, 1944	26,525	+ 3,664	48	251,679	173.827	+ 77,852	Stk.	16	12½	15	Nil
	Dorada	70	May, 1944	25,744	+ 3,805	21	123,083	98,259	+ 24,824	1 Mt. Db.	96	92	96	6½
	Entre Rios	808	24.6.44	20,310	+ 3 846	52	1,014,336	923,394	+ 90,942	Ord. Stk.	9	5½	4¾	Nil
	Great Western of Brazil ...	1,030	24.6.44	20,900	+ 8,600	26	554,000	395,700	+ 158,300	Ord. Sh.	59/9	24/4½	30/–	Nil
	International of Cl. Amer. ...	794	Apr., 1944	$651,727	+ $8.267	16	$2,985,369	$2,665,812	+ $319,557	—	—	—	—	—
	Interoceanic of Mexico ...	—	—	—	—	—	—	—	—	1st Pref.	2⅜	1⅛	½	Nil
	La Guaira & Caracas... ...	22¼	May, 1944	8,707	— 813	21	38,153	45,395	— 7,242	5 p.c. Deb.	90	80	80	6½
	Leopoldina	1,918	24.6.44	43,614	+ 4,857	26	1,149,046	829,565	+ 319,481	Ord. Stk.	7¾	4	4½	Nil
	Mexican	483	21.6.44	ps. 322,200	— ps. 102,200	23	ps. 10,457,700	ps 9,157,500	+ ps. 1,300,200	Ord. Stk.	1⅛	⅜	½	Nil
	Midland Uruguay	319	Apr., 1944	15,425	— 1,909	42	171,193	152.948	+ 18,245	—	—	—	—	—
	Nitrate	382	15.6.44	5,581	+ 980	24	87,451	66.640	+ 20.811	Ord. Sh.	83/9	71/3	72/–	Nil
	Paraguay Central	274	23.6.44	$54,788	+ $ 26,668	26	$2.685,484	$2,126,090	+ $559,394	Pr. Li. Stk.	75	51½	68½§	8¼
	Peruvian Corporation ...	1,059	May, 1944	123,501	+ 30,562	48	1,209,296	940,331	+ 268,965	Pref.	17⅞	10¾	10	Nil
	Salvador	100	Apr., 1944	c 152,000	+ c 30,000	43	c 1,310,000	c 1.034,000	+ c 276,000	—	—	—	—	—
	San Paulo	153¼	—	—	—	—	—	—	—	Ord. Stk.	71	57	47	4½
	Taltal	160	May, 1944	5,140	+ 2,750	48	59,800	46,206	+ 13,594	Ord. Sh.	37/6	20/-	17/6	Nil
	United of Havana	1,301	24.6.44	51,753	— 7,658	52	2,953,406	2,679,354	+ 274,052	Ord. Stk.,	8⅝	3¼	3	Nil
	Uruguay Northern	73	Apr., 1944	1,464	+ 8	42	14.730	14,105	+ 625	—	—	—	—	—
Canada	Canadian Pacific	17,034	21.6.44	1,213,200	+ 92,800	25	29,111,200	25,592,200	+ 3,519,000	Ord. Stk.	18	13⅞	15¾	3½
India†	Barsi Light	202	May, 1944	23,250	+ 4,058	9	51,682	45,240	+ 6,442	—	—	—	—	—
	Bengal-Nagpur	3,267	Mar., 1944	1,036,350	— 125,175	11	12,526,575	11,211,375	+ 1,315,200	Ord. Stk.	104½	101½	109½	3½
	Madras & Southern Mahratta	2,939	Mar., 1944	358,125	— 7,925	52	10,447,866	8,913,942	+ 1,533,924	—	—	—	—	—
	South Indian	2,349	20.12.43	199,410	+ 24,449	37	5,321,558	4,562,445	+ 750,113	—	—	—	—	—
Various	Egyptian Delta	607	10.5.44	18,922	+ 4,337	6	76,365	56,347	+ 20,018	Prf. Sh.	6⅛	2⅞	4	Nil
	Manila	—	—	—	—	—	—	—	—	B. Deb.	45	32	41	Nil
	Midland of W. Australia ...	277	Apr., 1944	20,621	— 13.805	43	291,154	320,996	— 29,842	Inc. Deb.	101	93	99½§	6
	Nigerian	1,900	31.3.44	60,973	+ 9,831	52	4,121,523	3,606,468	+ 515,055	—	—	—	—	—
	South Africa	13,291	13.5.44	827,962	+ 21,846	6	5,333,699	5,031,550	+ 302,149	—	—	—	—	—
	Victoria	4,774	Dec., 1943	1,414,598	— 101,765	—	—	—	—	—	—	—	—	—

Note. Yields are based on the approximate current price and are within a fraction of ⅛. Argentine traffics are given in sterling calculated @ 16⅔ pesos to the £

† Receipts are calculated @ 1s. 6d. to the rupee § ex dividend